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The Forests of the North.

On a country like Great Britain, which depends so largely for her supplies of building woods upon foreign sources, a brief account of the extent and conditions of the Scandinavian woods and forests cannot fail to be of some interest. The amount of timber annually exported from Sweden is enormous, reaching to nearly 150 million cubic feet. The precise figures for three years are as follow:—

	1874.	1875.	1876.
Deals and planks of fir and pine (c.ft.) ...	83,004,079	82,118,073	96,792,006
Beams & rafters (c.ft.)	17,918,984	14,517,826	17,501,785
Masts and spars (no.)	607,720	476,069	504,308
Pitprops (no.)	13,242,693	7,410,169	10,268,921
Staves of beech (no.) .	27,243,358	23,303,856	27,102,187
Staves of oak (no.) ...	1,636,648	1,288,397	1,058,631

Both Norway and Sweden have been very recently described in detail by writers who have apparently spared no pains in collecting information, the former country by Dr. O. J. Broch, and the latter by Dr. Elis Sidenbladh.

About 20 per cent. of the whole superficial area of Norway, or 64,000 square kilomètres, are estimated to be occupied by forests, which are apportioned thus throughout the kingdom:—

Christiania and Hamar district	27,000	square	kilos.
Christiansand	9,000	,,	,,
Bergen	2,000	,,	,,
Trondhjem	12,000	,,	,,
Prefecture of Nordland	9,000	,,	,,
Prefecture of Tromsö and Finmark	5,100	,,	,,

The different portions of the country are wooded very unequally, the western seaboard being very sparingly furnished with trees, even at the head of the fiords, and the coast itself is almost bare of timber. The prefecture of Stavanger is perhaps the poorest in forest wealth, and, with the exception of its most inland portion, to the east of Skjoldfiord, can scarcely furnish enough for its own wants for building purposes, so that the inhabitants have to obtain nearly all that they require from the eastern side of the kingdom. The seaboard of southern Bergenhus is also very unfurnished with timber, except at the interior heads of the fiords, and the same want of wood is felt, though in a less degree, in northern Bergenhus and Romsdal. Peat is largely burnt in these districts as fuel. The majority of the forests of Southern Norway are found in the neighbourhood of the rivers Tista, Drammselv, Glommen, and Skiensely, and in the northern part of the country, near the head of Trondhjem Fiord, and in the valley of the Namsen, in the same prefecture; along the course of the Vessen, in the province of Nordland, and those of the Målselv and Bardoelv in that of Tromsö. There is little doubt, however, that fully half of Norway was densely wooded in ancient times, not only in the south, but also on the westerly coast, and this great decrease was due to the reckless destruction of timber that has taken place in the country for centuries past. During the civil wars of the twelth and thirteenth centuries, and the wars with the Hanseatic Towns in the fourteenth and fifteenth centuries, large tracts of forest were burnt down, and especially on the seaboard, and it has been found impossible to replace them, partly from the exposed and stormy climate, and partly from the mischief done to the growing trees by the herds of sheep and goats which wander about at their own free will. Even in the eastern parts of Norway there is a perceptible diminution of forest trees, owing to the waste of wood used for heating farmhouses and châlets; indeed, it is considered that through want of supervision, the altitude of forest growth has been lowered. The authorities do not appear to have been insensible to this waste of the riches of the kingdom, and, indeed, ever since the middle of the sixteenth century, it has been attempted to check this waste by legislative forestry enactments, which were applied equally to the State forests as to those owned by private individuals. As regards the latter, in particular, the laws seem to have done very little good, but rather to have given rise to protests and complaints against the restrictions. To such discontent did they give rise that the last of these laws was finally repealed in 1836, since when there has been no restriction whatever as to the cutting of timber, and although up to 1860 it was limited to privileged saw-mill companies, it is now free to anybody to cut as he likes. When the kingdom of Norway was consolidated at the end of the ninth century, all the *almenninger*, or those lands which were not claimed by any private owner, were declared the property of the State, but the people were given the right to take away from the land as much wood as they wanted for building purposes and fuel. About the beginning of the fourteenth century timber assumed a commercial value, and the State then began cutting down for selling purposes, though even then each commune had the first right to taking the wood as far as was necessary for its own wants. There was, however, very little system applied to the forest cutting, the trees not being even marked, so that the State woods, called *almenningskoge*, became diminished, and quite insufficient to supply the wants of the inhabitants. Incendiary fires, too, were not uncommon, and, as time went on, serious complications and lawsuits sprang up between the private owners and the communes, which encroached on the rights of the former. Whenever any great financial crisis happened, such as that which took place at the beginning of the last century, a decree was passed authorising the sale of the State woods, and this occasionally took place until 1821, when everything of the kind was strictly prohibited. The prohibition, however, was taken off in 1848, and the sale of woods and forests went on until 1863, when it was again stopped, and it has never since been renewed. Singularly enough, the rights of the people to cutting wood were never interfered with by the forests being sold and changing hands, and they are still guarded with great jealousy on the part of the inhabitants, who nominate a commission to look after and protect these rights. Great changes are impending in Norway as to the legal condition of the *almenninger*, and after 1884 they will all be divided and cease to exist as such, whilst those portions belonging to the inhabitants who have the right of cutting will become what is called *bygdealmenning*, or land common to the inhabitants of the parish.

There are certain owners of forests in Norway, in addition to the *almenninger*, in the shape of public bodies, such as the Trust Fund for public instruction, the silver-mine establishment at Kongsberg, and an extensive legacy trust of a M. Angell at Trondhjem, all of which own large tracts of wood. Like the State forests, these are administered by a Forest Board founded in 1857, and composed of ten directors and seventeen assistant directors. The Kongsberg mines, however, appoint their own superintendent. They altogether comprise about 7,000 square kilomètres, or about one-ninth of the whole forest area, and furnish a great deal more timber than those forests which are in private hands, for the reason that they are better looked after.

The bulk of the Norwegian forests is composed almost exclusively of fir (*Abies excelsa*) and pine (*Pinus sylvestris*), though in small patches are found also the white alder, the beech (*Fagus sylvatica*), and the oak. The pine is universal, growing in the south at an altitude of 2,800 ft.; in North Gredbrandsdal (62° lat.), of 2,700 ft.; in the Trondjhem district (63° to 65° lat.), of 1,950 ft.; in Nordland, of 1,500 ft.; and in Finmark (70° lat.), of rarely more than 600 ft. or 700 ft., above the sea-level. The fir is found chiefly in the eastern part of the country, and in the Trondjhem district. On the western coast, it is not met with wild south of 62° latitude, though there are plantations of it in several localities. The only places where it is met with wild are in the peninsula of Hordaland, at Mo, and at Voss (66° 38′ lat., 4° 5′ long.). On the other hand, north of Cape Stat, it grows on the islands along the coast as far as 65° latitude; but beyond that it is seldom seen, and certainly not in the form of forest growth. In Eastern Finmark, however, it is found in South Varanger, near Lake Kjolmejavre (69° 30′ lat.), but in separate groups, and not as a continuous forest. In some parts of southern Norway, the fir grows at the same elevation as the pine, though in general its limit is from 200 to 300 ft. below it. Both pine and fir attain very respectable dimensions, though it must be confessed that, as the roads are extended and improved throughout the country, there is a

gradual disappearance of the larger growths. At North Aurdal, in Valders, there are still two fir-trees, called "the sisters," which, when measured as far back as 1864, were 90 ft. in height and 3½ ft. in diameter at 4 ft. from the ground. But in Northern Norway and Finmark both trees grow to a less height, though they attain a pretty considerable girth. In Selbo there was cut down, the year before last, a pine over 100 ft. in height and 4 ft. in diameter at the same distance above the ground. The age of this tree was probably from 175 to 180 years. The period required by both pine and fir to arrive at the dimensions when they are fit for cutting down for building purposes, varies very much, according to the situation of the forests. The rate of growth is greatest in the young trees, and it naturally decreases as the tree gets older.

THE RELATION BETWEEN WAGES AND DIVIDENDS.

In our last number we gave some account of the statements made by the chairmen of some of the most important railway companies at the recent half-yearly meetings. The point of view chiefly illustrated was the relation between the depression in trade, from which all classes of the community are suffering, and the falling off of the gross revenues of the companies.

There is, however, another point of view, of more permanent, and therefore of really more serious, interest, as to which the speeches of the several chairmen have been remarkable for a unanimous reticence. We refer to the degree of compensation which has been obtained for the reduction of income by the corresponding reduction of expenditure. And closely connected with this is the question of the relation between net earnings and capital. We have a good deal of detailed information on these heads furnished in the various reports. But there has been no attempt to grasp the subject as a whole; and the figures actually given, though enough to enable those who can compare them with the Board of Trade returns year after year to institute an instructive comparison, are so varied in their detail that no general result can be attained without some serious and comprehensive work of an analytical nature.

Taken in the block, the falling off in the aggregate gross incomes of the twenty principal railway companies of the United Kingdom has been 702,007*l.* There has at the same time been a decrease in working expenses of 473,394*l.*, leaving a decrease of net profit of 228,601*l.* for the half-year. This is a decrease of 1·8 per cent. on half the annual net profit of 1878. It has been arrived at by the difference between a decrease of 2·5 per cent. in the gross income of the lines in question, and a decrease of 3·2 per cent. in the working expenditure. The figures may vary slightly if the comparison be made between the corresponding half-years; but we have taken half the annual return from the Board of Trade accounts, which do not distinguish the half-years. The proportion as between the different items will be much the same, and we can rely on the figures of the Board of Trade.

It follows that the whole economy effected by the reduction of wages, and by such reduction in the cost of materials as may have been effected during the half-year, is only 0·7 per cent. on the working expenditure of 1878; the reduction of cost being 3·2 per cent., and the reduction of income, and presumably of work done, being 2·5 per cent. It is not immediately ascertainable over how much increase of capital the decrease of net earning has to be really distributed. The increase of capital in 1878 was, on the average of all the lines of the United Kingdom, 2·1 per cent.; so that the increase for the first half of the year will probably not fall far short of 1 per cent.

That after all the trouble caused by the reduction of wages there should not have been effected a net reduction in the working expenditure of the great Railway Companies, in proportion to the work actually done, of more than ¾ per cent., is probably a more serious outlook than the question of the decline of gross income for the year. It will be remembered that in what we said as to the strike on the Midland line we expressed the most pointed doubt whether the reduction of 5 per cent. in wages would produce a corresponding reduction in expenditure. The figures we have given show conclusively that our anticipation was correct.

The net receipts on the Railways of the United Kingdom in 1878 amounted to 29,673,000*l.*, being 558,000*l.* more than in 1877. Thus the difference, or movement, for the half-year just expired, has been about as much to the bad, as that of the corresponding half-year in 1878 was to the good. It is, however, only a difference of about 2 per cent. per annum either way, a tax on his profits which the shareholder could not feel, in itself, to be ruinous.

But the cost of an average mile of railway in the United Kingdom, which in 1877 stood at 39,472*l.*, had risen by the close of 1878 to 40,301*l.*, or by more than 2½ per cent. And this is a permanent rise. If the same rate of increase of capital be taken for the past half of 1879, the loss to the shareholder will have amounted to more than double that shown as loss of net profit, as the additional sum which he ought to have received to pay interest on his additional capital, is more than the actual loss. The fact that we have to indicate this loss by the preceding sentence, instead of by a single line of figures, is enough to prove that these explanations of the state of the subject are not so well kept up to the mark as ought to be the case.

Another point comes out from the comparison of the increases and decreases of receipts and cost on the different lines, which at present seem to mock analysis. It is probable that it indicates one of those tests of the good or bad management of railways which may, when fully understood, prove of great value to the shareholders. As yet we can only call attention to the fact.

The London and North-Western, with a reduction of gross income of 148,000*l.* for the half-year, on a gross annual income, in 1878, of 9,390,000*l.*, has economised 137,000*l.*, or 92 per cent. of its loss, in working expenses. The North Staffordshire, losing 12,240*l.*, has saved 17,857*l.*, or 145 per cent. of its loss, being thus 5,600*l.* to the good. A certain relation may be perceived if we take out the percentages of saving as compared to loss of traffic. Thus the Lancashire and Yorkshire have recouped 66 per cent., the North-Eastern 61, and the Sheffield and Manchester 58½ per cent., of their losses by their savings.

On the other hand, the Great Northern, with an additional income of 66,000*l.*, has increased its working expenses by only 32 per cent. of that increase; and the Great Eastern, with an additional income of 40,000*l.*, has increased its working expenses by only 18½ per cent. of that sum. These are lines of approximately similar description of traffic, so that they may be taken as affording examples of the relation borne to the economy effected under somewhat similar conditions, on an increasing and on a decreasing income.

Among passenger lines, the London and South-Western has had an increase in working expenses which swallows up 85 per cent. of its 50,000*l.* of additional traffic. But the London and Brighton has spent 420*l.* more to earn 30,000*l.* less. The South-Eastern has economised 20 per cent. out of its loss of 44,000*l.* The London, Chatham, and Dover has economised 22½ per cent. out of its loss of 14,600*l.*, And the two Metropolitan lines, taken together, have spent 3,900*l.* less, in order to earn 5,300*l.* more, than in the corresponding half of 1878.

We are anxious not to be in too great a hurry to draw an inference from these figures. We are content at present to give to the shareholder an additional element of contemplation by showing the per-centage relation of the figures which are already in his hands. It must be remembered that the rate of wages differs in different parts of the country, and also that the cost of working any line is affected to a considerable extent by the volume of the traffic. It is possible that the corrections which are due to these differences, if we had the means of making them, would explain the slight differences in similar groups of lines, such as the Lancashire and Yorkshire, the Midland, the North-Eastern, and the Sheffield and Manchester railways. In other cases it can hardly be doubted that such figures as those of the London and North-Western returns point to a loss of non-remunerative traffic; while the difference of the advantage acquired by the Great Eastern and by the London and South-Western lines, in their respective increases of 40,000*l.* and 50,000*l.* of traffic, is very noteworthy. The steady gain in earning power of the purely passenger lines which are on the increase in their gross incomes, when compared with the small saving of the London, Chatham, and Dover, and the extra cost of the London and Brighton, on a decreasing revenue, points, we suggest, to the cost of competition, as it prevents each company from diminishing the number of its trains in proportion to the diminution of traffic. To take off one or two carriages does not make much difference in the cost per train-mile. On the other hand, when freight does not come freight-trains are not run. Our columns are hardly the place for a more full analysis of these pregnant facts. But we think it important to call attention to the valuable results that may be obtained by such an analysis.

On the whole survey, it cannot be denied that the elasticity of the system under a period of general depression has been surprising. It should be remembered that one unseen element of diminution of net receipts to the companies may be traced to this depression, and that is, the gravitation of the passenger traffic towards the third class. It does not necessarily follow that this is a net loss to the companies. For example, it is probable that the third-class passenger traffic to such a place as Bournemouth pays better than the first-class, because a carriage may be run the whole distance to carry only two or three of the latter, while that which conveys the third-class passengers may be filled over and over again in the journey. This, however, is rather a matter of competition than of necessary cost, as no company ought to run carriages that are not on the average fairly filled, and, as a rule, only do run them in order to divert passengers from other lines. Elasticity is visible everywhere. The thing wanted is to develope their resources aright, and, above all, to nip in the bud the over-active elasticity of capital outlay.

ORNAMENTATION OF THE HOUSEHOLD AND THE PARIS EXHIBITION.

It is a theory which is happily now more than ever generally recognised, that instruction is the direct road to the accomplishment of the smallest, as well as the highest, aims. But, desirous as each of us may be to know, Socrates's wise definition of his own position possesses as much meaning, if not indeed more, in the present day, than it did in those classic days. "What I do know," the sage remarked, "is that I know nothing," and in the advance of the sciences this position is essentially that of most among us. It is a fable of old Æsop's, re-sung by the later fabulists, La Fontaine and Gay, that characteristic fable of the old man and his sons; we all remember the heritage he left them on his death-bed—a field, which, he said, dig and till, and search, for it contains a treasure you will find. Production, movement, and labour are always profitable, if not always for the present, at least for the future, a fact which in the midst of the existing depression which weighs on the commercial world must not be overlooked, and a fact which is particularly striking in such an exhibition as that at present open in the Palais de l'Industrie, in which the products of the industrial appliance of the sciences are so largely represented, and which to the student forms a small encyclopædia in action of the studies he is pursuing. There are, without doubt, many scientific men who collect their facts for the mere pleasure of continuing their researches, without the idea suggesting itself to them of drawing practical consequences from their application; but such seekers have their use, and the intelligent inventor who is not slow to avail himself of the means thus placed at his disposal, has more than once had to thank the patient labours of workers in the rich and still unreaped harvest of science. An exhibition such as this, and of which we have already spoken, affords numerous instances of this collaboration, in which the practical element has been skilfully applied to the discoveries of science. Such noticeably is remarkable in the modern production of the necessities which the exigencies of modern existence have so increased about us that rich and poor alike can enjoy, in comparative degrees, the pleasure of luxury, a quality perhaps as difficult to define as can be imagined. In the days of Aurelain silk, was a luxury enjoyed alone by empresses, but now it is the Sunday costume of every artisan's wife. At

the close of the fourteenth century, murmurs were raised against the extravagance of the Queen of France, Isabella of Bavaria, in possessing two *chemises* of linen; in the following century the noblest courtiers did not know the use of handkerchiefs, and instances of this nature might with ease be continued.

Henceforward, however, economic science has solved this question of luxury: when it is the natural result of work and ease, when it is enjoyed in common with thrift and the accumulation of capital, it is a proof of prosperity; but, on the other hand, when it is fictitious, the result of false pride or vanity, to be in accordance with fashion, when it can be traced to the evil effects of an administration or a government, erroneously urging extravagance "for the good of trade" and the encouragement of industry, from every point of view such luxury is to be deplored, and leads to consequences of which, perhaps, the present condition of the commercial world is only one example. It is but right (in spite of Lord Burghley's recently expressed opinion on this point) that each of us should enjoy a degree of luxury relative to our condition, without detriment to that reasonable economy which allows us to continue the habits we each have contracted. The two degrees of luxury, that which alone remains satisfied at the utmost expenditure, or that which remains contented by a small outlay, are not ill-represented in the Palais de l'Industrie, particularly in that group of the classification which refers to the adornment of the house, though, truth to tell, the exhibits, excepting always the beautiful and costly works of some of the well-known upholsterers, in their reproductions and revival of the cabinets, dressers and credences of the Renaissance, or in the hangings and tapestries "style Louis Treize," apparently supply more subject for reflection on what to avoid than on what to purchase; we, indeed, hardly envy the imagined happy possessor of any piece of the endless show of coarsely and finely painted pottery and porcelain and shapeless vases, and plates, and cups and saucers, and "artistic bronzes," the gilt chimney-pieces, and the gaudy clocks, as to which, the more the French are abused, the more they seem determined to thrust them into the world, and all the hundred other so-called "objects of art" which, in each succeeding French exhibition, continue to offend the person of taste.

In the present day, exception made in the case of the small, but happily increasing, number of houses in which the evidences of good taste are to be met, the mass may be divided into two classes: the too bare and the too crowded, which in each case, according to the taste of the occupants, resemble either the furnished lodging or the curiosity-dealer's shop. A want of evidence of some degree of luxury denotes, as a rule, the empty mind, the thoughts absent from the home, idleness on the part of the occupants, and as such a room is entered a sensation of chill strikes the observant mind.

With a choice to be made in such a bazaar as that now open in the Palais de l'Industrie, for as such it must really be looked upon, how would it be possible for any but those gifted with that experience and knowledge and perceptive power which constitute the possession of taste, to avoid producing an effect so often to be met with in the houses of our friends, but which, with all their boasted taste, is even oftener to be met with in the *appartements* of the French?

Since our first Great Exhibition of 1851, when England suddenly awoke to a consciousness of her unsatisfactory condition in artistic matters, such a revolution in the matter of what it has been decided shall be called "household taste" has been effected as can scarcely be paralleled. America within a few years has taken up as warmly, even if not more warmly, the question, and on both sides of the Atlantic writers and publishers have been busy in producing works such as may propagate the knowledge of a sort of "taste." Such cannot be said for the Continent, where the traditions of "Conservatoire" religiously conserve, among all but the numerous exceptions, the wildest and most mistaken views concerning "household taste."

An unfortunate extreme, it is true, has been reached in England when second-rate upholsterers fill the advertisement pages of our journals with the careful delineations of their ill-designed but pomposly-designated "Early English" mirrors and sideboards, their shoddy plush-covered tables, and bracket shelves and corner-cupboards; but, on the Continent, and in such an exhibition as that at present open in Paris, it is alone the person of means who is enabled to possess an object or piece of furniture in good style; those possessors of taste who have not at their command a long purse, and who seek in more modest simplicity the elegance which they demand, are sorely tried, and find it almost impossible, except perhaps in the broker's shop, to satisfy their desires.

To mention, in the exhibition at present being held in the Champs Elysées, any one or more of the numerous specimens of the furniture-maker's art would be worse than invidious; the old names come again to the front, not a little increased in number by the various models of furniture intended for double uses, many carrying out precisely that beau-ideal of usefulness spoken of by Goldsmith,—

"A bed by night, a chest of drawers by day,"

whose construction has before now puzzled more than one ingenious schoolboy.* Intended for the small quarters which French people seem so particularly attached to, such useful pieces of furniture would scarcely recommend themselves to our English idea of comfort; but certainly the facility of the management and the neatness of their effect are fascinating, if not to the pocket, at least to the eye. We cannot attempt to mention the hundred accessories in the ornamentation of the household here presented: the pottery and porcelain for daily use, the mirrors and the glass ware. We must say, however, of one firm, distinguished for its skill in this latter beautiful art,—Messrs. Salviati,—that their products (as exhibited in the pavilion prepared for the reception of the President of the Republic), cannot be looked upon as having advanced in taste since the day, not so many years since, when their beautiful Murano glass deceived the wary dealers of Wardour-street.

FROM THE BANKS OF THE SEINE.

In the quiet town in which Viollet-le-Duc died, and where he has left some of the last traces of his work as a restorer (in the Protestant cathedral of Lausanne), his earthly remains will rest. The simplicity which has marked the whole of his long and active career was reverently observed in the funeral of the eminent architect, round whose grave were gathered many of his old friends, but no addresses were delivered, a mark of respect paid to the last wishes of the simple-minded artist. It is always interesting to know the steps taken by great minds in preparation for their end, and through the kindness of Mdme. Viollet-le-Duc, the testamentary wishes of the deceased architect have been made known to the vice-president of the Société Nationale des Architectes de France, of which he was the active president. Seven years ago the following letter was addressed to his lawyer by the deceased:—

"July 10, 1872.

"Dear Sir,—It is each one's duty to prepare for all eventualities, and the sole thing which, during my lifetime, would torment me, would be the thought of the platitudes which good people would believe themselves obliged to say over my tomb.—Ever yours,

"Viollet-le-Duc."

This letter contained the following instructions:—"I desire that my funeral shall be of the simplest character, without any affectation, merely that the obligatory formalities shall be fulfilled, nothing more. If I die while travelling I desire that my body may be left and interred in the place of my decease, and that my heirs may be thus spared the transport of a useless and troublesome corpse. Wherever I may be buried I desire that over my grave no addresses may be made, and that a simple slab shall cover me, bearing simply my name, 'Eugène Viollet-le-Duc, born January 27, 1814, died ——.' Signed, 'Viollet-le-Duc.'"

The energy of the artist who has thus been so suddenly snatched away can scarcely be more characteristically proved than by mentioning the fact that in the course of the few short weeks' leisure he was able to enjoy from time to time in the mountain air of Switzerland, he was preparing a minute topographical study of Mont Blanc, while only within a week or so has been advertised as "in the press" a new work by M. Viollet-le-Duc, one of his valuable series of "Histories," the "*Histoire d'un Dessinateur*."

The death of this illustrious Frenchman has scarcely more occupied the attention of the public than the recent *fêtes* at Perpignan in honour of François Arago, to whom the world owes the determination (in the midst of a war between Spain and France) of the diameter of the earth, on which has been founded the whole metric system in use on the Continent, and on which depends the decimal system of calculation which, sooner or later, must be adopted by all civilised countries. Arago's life, in its earliest years one series of exciting adventures, was ever devoted to the cause of science. He was a student not alone contented with being a great *savant*, but determined to make his science useful to the world; a wise and ardent politician who never failed to utter his opinion, founded in the sound school of experience, whenever in the early days of this century the great questions of the marine, canals, and railroads were brought before the Chamber. It was by his recommendation that national recompenses were decreed to Vicat, one of the inventors of hydraulic cement, and to Daguerre, one of the pioneers in photography; it is to Arago's influence that the artistic world owes the Government purchase of the cabinet of M. Du Sommerard, now the precious collection of the Musée de Cluny; while his Parliamentary reports on the Seine navigation, on the necessity for the establishment of railroads in France, and on the fortification of Paris, have been justly considered as masterpieces of logic and science. It is the memory of this great man which has been celebrated in the unveiling at Perpignan of M. Mercié's excellent statue of Arago, and throughout France, in the hearts of all scientific students and philanthropists.

But science in France possesses many forms, and the science of life is no less honoured on the banks of the Seine than is its more generally acknowledged relation, the science of the laboratory and the observatory. With the end of September and the arrival of the first chilly evenings, earlier this year than usual, the watering-places, after their short season, are being deserted; Paris is again receiving its faithful inhabitants, and the artistic world is re-assembling in the capital. We cannot unfortunately here wait with pleasurable expectation for the opening of an exhibition at this time of the year like that held at Burlington House each winter, or in the Grosvenor Gallery, and by the various minor societies,—a strange fact in an art capital passionately fond of exhibitions; and so the artistic world throws itself into theatrical interest, and the active doings of the painters, the sculptors, and the architects are set aside till the spring, when the talk in the *ateliers* of the Salon and the Prix de Rome begins to again attract the attention of that comparatively limited number of thinkers which we are apt to call the public.

The winter theatrical season has commenced, and the mediocre success of the few new pieces that have so far appeared only the more predisposes one to welcome the old favourites, the revival of past successes. Foremost among these has been the representation of George Sand's charming pastoral play of "Claudie" in the quiet little Cluny Theatre in the classic Quartier Latin, under the shadow of the more classic ruins of Julian's Thermæ and the Cluny Museum, and within but a few steps of the Luxembourg Gardens and the humble lodging in which George Sand passed her romantic youth; and here has been revived "Claudie," which, twenty years ago, was first represented at the Porte-Saint-Martin, when poor Fechter took the part of the sentimental *Sylvain*. It has been a treat to the more refined public this simple play undisturbed by the usual falsely-delineated life of "society," a piece breathing all that poetic idealism which George Sand's brother artists, such painters as Mason and Millet, Breton and Walker, have so successfully thrown into their glowing canvasses. Those who may cry out at the want of realistic truth in this poetic representation of country existence may be right, but we none the less admire this conventional power which has thrown such a romance round the hard-working existence of the sower and the reaper, who seem at the present moment more than ever entitled to our sympathy. The first night of this revival of "Claudie" was a characteristic scene, and one those present will long remember, as they will the sympathetic homage paid to the romantic authoress in the sculptured delineation crowned

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* Or resembling that mysterious piece of furniture which Dickens has immortalised, and which, in resembling a bookcase, was in reality a bedstead.

amidst the costumed representatives of her numerous creations; the pedestal buried in luxurious flowers, which by a delicate attention had been specially sent by Mdme. Maurice Sand from George Sand's old garden at Nohant.

But notwithstanding that old favourites are being successfully revived in Paris, amidst the thankful acknowledgments of the people of taste, there are not wanting on the part of the Parisians instances of ingratitude; the disappearance of the old Théâtre Italien, transformed into a huge insurance-office, will long remain a blot on the artistic reputation of Paris society. Feeling unjustified satisfaction with their own meagre performances at M. Garnier's grand and gaudy New Opera-house, the Parisians have allowed one of the chief features of their winter season to pass away, and Paris will no longer hear the delicious strains of Rossini, of Donizetti, of Bellini, and of Mozart, interpreted with Italian gusto in the liquid tongue in which their *libretti* were composed. The house has been gutted, and the façades (for the building stood alone) refaced, and, truth to tell, beautified; the masons are busily at work, and before long the transformation will have taken place.

Long before the Avenue de l'Opéra cut its pretentious way through the labyrinth of historic streets round this Théâtre Italien, how often must Thackeray have seen the opera-cloaks and carriages whisk by, from the window of Terre's inn, in the rue Neuve des Petits Champs, that street,—

> "For which no rhyme our language yields
> The New-street of the Little Fields;
> And here's an inn not rich and splendid,
> But still in comfortable case;
> The which in youth I oft attended,
> To eat a bowl of Bouillabaisse."*

And how changed is the façade, perhaps, as we have already said, for the better, but alas! no longer the façade of the Théâtre Italien, but the well-restored home of a prosperous insurance company, from the scaffold-cased sides of which, only the other day, might have been seen fluttering the mangled bills of the last performances.

Lovers of acting had last Saturday an agreeable and rare treat in hearing the justly famous Italian actress, Ristori, for one night, at the Théâtre des Nations, on the occasion of a charity fête in favour of some suffering Alsaciens. Though on her way through Paris to Denmark, the generous heart of Ristori, who too well remembers the Austrian occupation of her beloved "Venezia," sympathised with the sufferers in those severed provinces of Alsace-Lorraine, and that is why, after she had been absent from Paris for more than ten years, we were able last Saturday to applaud the really great artist in the magnificent third act of Schiller's "Maria Stuarda." Whether or not the French critics present acknowledged the fact, it was impossible for the unbiassed observer not to remark the strangely different character of the tragic power of the veteran but still vigorous artist, and that to be seen in the best French theatres. The country which boasts a Clairon, a Mdlle. Mars, and a Rachel, cannot now with justice produce a rival to Ristori, or even her gifted and rising contemporary, Giacinta Pezzana, whom the Parisians have not yet heard. The round ring of Ristori's measured Italian,—so well known to the London public,—forms a marked contrast to the sing-song cadence of the French stage, and Mr. Matthew Arnold could not fail to have felt on last Saturday night, satisfied that this, his recently-expressed complaint against the delivery on the French stage, was justified.

A special treat is held out in the recently-published programme for October of a series of historical *matinées*, or morning performances, which are divided into two classes, plays representing and produced in certain epochs of French history, and a second series of international *matinées*. In the former we are to have represented a piece of the Gaulish period, by the distinguished historian, M. Henri Martin; then follow representative plays of the Renaissance, the reign of Louis XIII. (with pieces by Corneille and Scarron); that of Louis XIV. (Molière and Racine); Louis XV., Louis XVI. (the "Marriage of Figaro," by Beaumarchais); and the Revolution (Joseph Chenier's "Charles IX."). The international series is to comprise translations and adaptations from the drama of Greece, Rome, India, England ("Henry VIII." and "The Merry Wives"), Russia, China, Germany, Italy, Denmark, and Spain,—this latter in a piece by Lopez da Vega. Here is a programme tempting indeed, and a suggestion to some of our distracted managers unable to find attractive novelty. It may be observed that this is not the first season in Paris of these characteristic morning performances.

* This Bouillabaise a noble dish is,—
A sort of soup or broth or brew,
A hotch-potch of all sorts of fishes
That Greenwich never could outdo;
Green herbs, red peppers, mussels, saffern,
Soles, onions, garlic, roach, and dace,
All these you eat at Terre's tavern,
In that one dish of Bouillabaisse.
Thackeray's Ballads.

ANCIENT RUINS OF COLORADO.*

The ground examined by Mr. Jackson is in part the same and everywhere similar to that traversed by Mr. Holmes, and is bordered by Indian reservations. The country, as sketched by Mr. Holmes, is barren, cut up by "labyrinthine cañons," which "head close to the Dolores on the north, and ramify the plateaux in every direction with an interminable series of deep desolate gorges, and wide barren valleys. There is not a living stream throughout this whole region. During the summer months water occurs in but very few places,—generally in pockets, sometimes in springs, where the excess, if any, is soon swallowed up by the hot and thirsty sands." In winter, however, the showers rapidly gather in the main channels, and rush down in great but short-lived floods. The ruins on the McElmo and Hovenweep consist of cliff houses and cave dwellings, and are like those already described. At the angle formed by the junction of the McElmo and the Hovenweep cañons, upon the summit of the "Mesa," are some very curious remains. These consist of small squares, measuring about 3 ft. by 5 ft., arranged in rows 2 ft. and 3 ft. deep, facing to various points of the compass, and formed by thin slabs of sand-rock set on edge. There are also a few circles. They occupy the whole of a level area of about 22½ acres, only joined to the main plateau by a narrow neck, across which a wall formerly extended. It is conjectured, in the absence of any other explanation, that they were graves; but nothing whatever beyond a thin layer of vegetable charcoal has been met with in any of them. Similar groups of rectangles are found scattered throughout the whole region, in the valleys as well as on the Mesa tops.

Remains of round watch-towers on the elevated plateaux, often far from water, are frequent, and form another important feature. Being situated in regions where cultivation and permanent residence are impossible, it seems likely that they were the places of look-out and refuge of shepherds, who brought their flocks to graze.

Among the more important ruins in the main valley of the San Juan, are those of an extensive quadrangular and somewhat massive stone building, of extreme antiquity, to judge by its crumbled state. The rooms are arranged round, and converge towards, a semicircular series of seven chambers, enclosing a central room of the same form. This building had a river frontage of 158 ft., and beyond it can be traced rectangular corrals or inclosures within adobe walls, which, it is conjectured, were used for cattle. In the bluff immediately underneath is a row of "rock-shelters" occupying, as usual, a niche formed by the weathering of a soft stratum between harder rocks, assisted perhaps by digging. The niche, about 300 ft. long and 6 ft. deep, contains the remains of numerous small dwellings, averaging about 6 ft. square, and in which it is barely possible to stand upright, communicating together by small windows. Very numerous dwellings of this kind, situated in almost inaccessible positions, occur in the bluffs which closely border the river. "One group consists of a row of three small houses built upon a ledge running horizontally along the perpendicular face of the bluff, about 60 ft. above the trail immediately below it. The ledge was so narrow that the buildings occupied every available inch of its surface. . . . . No possible means of access were discernible, and if ladders were ever used they were taller than any of the trees available for that purpose now growing in this vicinity."

One of the most striking, perhaps, from its position, of all the cave dwellings, is situated at the back of a wide-mouthed semicircular cave, 100 ft. in depth. The houses in this case were considerably larger than usual, and one-storied. The arrangement of the rooms implies that there were workshops and kitchens in common, and eleven smaller dwelling-chambers. From certain round holes drilled in the rocky floor, it is inferred that the people were acquainted with the use of the loom, and grooves worn in the rock are thought to indicate the manner in which the stone implements were shaped and polished. "The masonry displayed in the construction of the walls is very creditable; a symmetrical curve is preserved throughout the whole line, and every portion perfectly plumb; the subdivisions are at right angles to the front. The stones employed are of the size used in all similar structures, and are roughly broken to a uniform size. More attention seems to have been paid to securing a smooth appearance upon the exterior than the interior surfaces, the clay cement being spread to a perfectly plane surface, something like a modern stucco finish."

In the Rio de Chelly, which is a small tributary entering the San Juan Valley from the south, is another remarkable ruin. In a bend of the valley is a recess, 70 ft. above the dried-up bed of the stream, and overhung by a massive wall of sandstone, in which was found a "cave-town." The cave-town consisted of a solidly-constructed central round tower, and grouped about this were some seventy-five rooms, the whole arrangement of the buildings appearing admirably adapted for defence.

In a side cañon of the same valley, comparatively perfect remains of a two-storied house were found. This was perched as usual in a small niche in the rocky cliffs, and was only accessible by a long flight of stairs cut in the smooth rock.

Epsom Creek, another tributary of the San Juan, enters its valley from the opposite side to the Rio de Chelley, and also contains in one of its lateral cañons a numerous group of ruins. Most of these are mere single-roomed, smoke-blackened "cubby-holes." "In one instance a bluff, several hundred feet in height, contains half a dozen small houses sandwiched in its various strata, the highest being 150 ft. above the valley. Each consists of but one room, and one of them is a perfect specimen of adobe-plastered masonry, hardly a crack appearing upon its smoothly-stuccoed surface." Near the entrance to this cañon is a square tower, built on a large and now perfectly inaccessible boulder. In the Epsom valley itself, among others, are the almost effaced ruins of a considerable town, including several round towers and large rectangular buildings.

The Montezuma cañon, also on the north side of the San Juan valley, is merely a narrow gorge, 1,500 ft. deep, and with precipitous sides. The bed of the stream, when surveyed, contained but a few stagnant pools, and was densely thicketed with oak, brush, and tangled vines. Yet this narrow valley Mr. Jackson describes as having been once thickly populated. "We had gone but a few rods before we commenced picking up pieces of pottery, and meeting other evidences of former occupation. Within three miles a cave-shelter appeared, and then, as the valley widened, it was dotted in many places with mounds thickly strewn over with the ever-accompanying ceramic handiwork of the ancient people in whose footsteps we were following, which occurred so frequently, and to such an extent, as to excite astonishment at the numbers this narrow valley must have supported." Many of the dwellings can only be approached by means of steps or small foot-holes cut in the smooth sandstone, and other stairways seem to have been made, as means of escape from enemies, up the nearly perpendicular sides of the cañon. About half way up the Montezuma cañon a second cañon intersects it, when the bottoms widen, and are 200 yards or 300 yards across, and "are literally covered with ruins, evidently those of an extensive settlement or community." "The ruins consist entirely of great solid mounds of rocky *débris*, piled up in rectangular masses, covered with earth and a brush-growth, bearing every indication of extreme age; just how old is about as impossible to tell as to say how old the rocks of this cañon are. This group is a mile in length, in the middle of the valley-space, and upon both sides of the wash. Each separate building would cover a space, generally, of 100 ft. square; they are seldom divided into more than two or four apartments. Relics were abundant, broken pottery and arrow-points being especially plentiful and of excellent quality." Still farther up, the cañon increases to 500 and 800 yards in width,

* See p. 923, *ante*.

and promontories extend partly across it, or have been washed into mounds by the stream. Each of these,—sixteen to eighteen in number within a distance of fifteen miles,—is crowned with ruins of old and massive stone-built structures, which commanded a clear look-out up and down the cañon. These structures, now in a complete state of ruin and overgrown, were rectangular, and from 30 ft. by 50 ft. to 100 ft. by 200 ft. square, and consisted of a mass of small rooms arranged without any appearance of order, and conforming to the irregularities of the surface on which they are built. One of these is singular in the possession of a wall traversing a spur or bench running out from the promontory for 200 ft., and elevated 10 ft. above the valley. Among the *débris* once forming this wall are seven stones still standing, 7 ft. high above ground; and abutting on one side of this wall are the remains of what were, perhaps, cattle inclosures. About the lower ends of these "towns" were a number of the small cliff-houses. One of these, in an exceedingly good state of preservation, occupied a deep oval hole in a block of sandstone,—perched about 50 ft. above the valley. Ruins of other large square buildings occur abundantly in the wider part of the valley beyond, and about them all immense quantities of pottery and flint arrow-heads lie scattered.

A separate chapter deals with the finest ruins of all in the little-known Chaco cañon in Northern New Mexico. They are situated about seventy to eighty miles south of the San Juan group, and in a somewhat desolate country.

The buildings are large, many-chambered edifices, similar in construction to the modern pueblos, but built more solidly and with greater care. Eleven of these ancient pueblos are described. In plan they are, with two exceptions, perfectly rectangular, and occupy either two or three sides of a courtyard. They vary much in size, and probably more so in age. The largest is 544 ft. in length and 314 ft. wide. The stones employed average about the size of an ordinary brick; but as the larger pieces were not uniform, the interstices were built in with thin pieces of sandstone, so closely and compactly fitted together that the joints are only visible when the observer is quite near. "A clay mortar was used plentifully within the body of the wall, but does not appear anywhere upon the surface. Great pains were taken in the construction of the doorways, the stones being more regular in size, and the corners dressed down to perfect right angles." In some cases the masonry is composed of very small stones, compactly fitted, without any cement appearing on the surface, as many as 450 pieces appearing in a square yard. Other examples of masonry show perfectly equal rectangular stones, of the size and form of bricks, and between these are in some cases layers of smaller tile-like pieces, recalling the tile-layers in Roman walls.

One of these, and this not one of the larger size, is estimated to have accommodated some 200 inhabitants. They all comprise estufas, the largest pueblo possessing as many as twenty of these. The enclosed courtyards in front of the buildings present very irregular and broken surfaces, as if they had been occupied by underground apartments, now fallen in, and it is remarkable that the Moquis at the present day work in such underground rooms, as much for warmth in winter as for coolness in summer. They were built of four stories, in terraces, access to which can only be had from the outside by ladders, and, with a further view to defence, the outer walls were only pierced with very small windows.

Much of the wood-work remains in some of the pueblos, and in one of the largest the floor timbers project 4 ft. or 5 ft. through the outer wall on the shady side of the house, as if intended to support a balcony. Lieutenant Simpson, who visited the ruins of the pueblo of Chettro Kettle in 1849, describes a ceiling of one of the rooms, which seems to have since disappeared. "The ceiling showed two main beams laid transversely. On these, longitudinally, are a number of smaller ones in juxtaposition, the ends being tied together by a species of woody fibre, the interstices chinked in with small stones. On these again, transversely, in close contact, was a kind of lathing of the odour and appearance of cedar, all in a good state of preservation."

Noticeable features in the vicinity of all the ruins are the mounds or refuse heaps, consisting mainly of broken pottery and flint. Systematic research in the foundations of the ruins, which appear to be filled in to a considerable depth, and in these heaps, would probably throw a flood of light upon the history and habits of the people. No excavations have yet been made, and only hasty explorations, and there is every reason to suppose that the remains beneath the ground are of far greater importance than those which still stand above.

The pottery is especially remarkable. "All who have ever visited the region of the ancient ruins, which covers all of New Mexico and Arizona, and portions of adjacent territory, have been impressed with the vast quantities of shattered pottery scattered over the whole land, sometimes where not even a ruin now remains, its more enduring nature enabling it to long outlive all other examples of the handiwork of the makers." The prevailing ornament is based upon the Etruscan key-border with a step-like break in one of its members. More rarely the key-border is perfectly Etruscan, and the well-known Greek scroll border is used. A few of the vessels are perfect, and their form is simple and not without dignity.

Five plates of the modern pottery of the Moqui pueblos are engraved, and it is impossible to help contrasting the excellent ornamentation and simple outlines of the one, with the crudeness and bizarre forms of the other.

It is difficult to conjecture at what date any of these buildings were constructed. Mr. Holmes considers that the cliff and cave dwellings were occupied until at least as late as the Spanish Conquest, and that the pueblos are more ancient. The depth and position in which some of the remains are buried, especially pieces of excellently-painted pottery, preclude any very recent period, while, on the other hand, the preservation of wood indicates no vast antiquity. It seems certain, therefore, that the remains belong to different periods extending over many centuries.

It is evident that, owing to some unknown cause, a change occurred in the habits of the ancient people, and that they forsook the handsome and spacious pueblos, perhaps to seek safer and less conspicuous abodes; for from certain indications, the nearly inaccessible cave-dwellings seem to have been occupied more recently than other ruins. It appears as if it had become of paramount importance to them that their abodes should be impregnable and concealed. No speculations on this point are hazarded by the authors, but the suggestion is likely to occur to the reader whether the extremely defensive position may have been taken up owing to pressure of wilder and more warlike neighbours of the East, as they became restless, and migrated in front of the first colonisations of America from Europe. J. S. G.

SMALL CULTURE ON A GREAT SCALE.

The *Times* of the 23rd ult. contains a very interesting account of the results of what our French neighbours call *la petite culture* in the Isle of Axholme, a portion of the previous bed of the sea won to the support of agriculture by the unceasing toil of successive generations, where the attachment of the small owner to his hereditary acres, or fractions of an acre, appears to be as strong as it is in the rural districts of France. It would not be doing justice to the account either to abstract it or to make mere extracts from it. It well deserves careful study on the part of all those who are aware of the various questions now on the carpet, or in the air, regarding the holding and the yield of land. But we cannot refrain from noting one or two points which struck us on perusal of the paper.

The first of these is, that in order to succeed, small cultivation must be what its name implies. It must not be an attempt to carry on large cultivation, as to area, by small means, as to capital and labour. No outcome of recent experience is more sure than that there is a great economy in the execution of certain agricultural operations on a large scale. That there are other operations in which the advantage of personal interest and close proximity to home are greater than those insured by the use of labour-saving machinery is no doubt true. But the thing required is, to understand exactly the advantages and disadvantages of what, in point of fact, differ in no respect from the two occupations of gardening and of farming.

For example, some years ago, the greater pulverisation and turning over which could be obtained by the use of the spade, instead of that of the plough, were considered to be so valuable as to compensate the labourer for the much greater cost of spade-labour, as compared with horse-ploughing. In some soils and for some crops there is every reason to suppose that this estimate was correct. But the case is altogether altered by the introduction of the steam plough, the scarifier, and the other mechanical means for pulverising the soil. The balance of efficacy is entirely changed. It is now in the same scale as the balance of economy. The subsoil can be far more efficiently reached by steam culture than it can be by hand culture, unless at such an extra expense as to be practically prohibitory; and not only so, but the no less considerable item of saved time has to be taken into account. The essence of spade labour is that it should be gradually applied. If a large amount of work has to be done by the spade, either a large number of labourers has to be employed, or the progress is painfully slow. Now, the breaking up of the ground and preparing it for new crops, the very moment that the old crops are reaped, is an essential element of good farming, and one which is in favour of steam culture and against hand culture to an enormous extent. In small intersecting pieces of land, such as those at Axholme, steam culture is out of the question. It demands a large area of land under the same treatment at the same time; that is to say, it requires a certain size of holding.

Again, not only does small culture demand more human labour than great culture, but it requires that labour to be of a more costly description. For unless the owner-cultivator makes more out of the land by his work than a common labourer does, he is in no whit superior to the common labourer. He may, indeed, have the satisfaction of saying, "The field is my own!" But he pays a heavy price in toil for that satisfaction. It may well be doubted whether it is worth his while. In no respect is it a benefit to the nation. This is the case where, as at Axholme, the main business of the small owner is the cultivation of the land. Quite the opposite is the case with regard to the cottage-garden. The labour bestowed upon that is an unfelt toil. An hour in the day, bestowed on the garden, for 300 days out of the year, would be rather a recreation than a hardship to many a cottager. But that hour a day would represent a month's work, and indeed much more than a month's work, in the year. For in the labour of petty culture it is the constant tendance, and the apt attention to little things at the exact moment that is proper, which are of value, rather than steady or rapid work. The actual amount of digging in the year will be small, and so distributed as to be almost unfelt as a toil. It is the constant application of the light work, which adds so little to the sheer toil of the gardener, which makes garden culture answer. Thus the requirements of the field and the garden are reversed; and the method of culture, and the size of ownership, that pay best for the one, pay worst for the other.

There is another element of comparison which it demands a case like that of Axholme to display. Of all the toil of the labourer, that which it is most desirable to diminish by mechanical aid, or by other means, is the toil of walking to and from his work. In the cottage garden this toil is at the minimum. When the holdings form the more serious part of the business of life, as in the case in question, it is at a maximum. So keen, we are told, is the competition for land, that space is grudged for trees,—for hedges,—for barns,—for boundaries,—we suppose for roads. Thus the distance of daily walk added to the daily toil is great. And that is the case not for the man alone, but for the carriage of the produce to the barn, to the thrashing-floor, or to the spot which, in a normal farm, would be as central as possible for the produce.

When we say that absence of hedges means absence of birds, and that absence of birds means abundance of slugs, snails, grubs, beetles, wire-worms, caterpillers, and the whole vast army of foes to the farmer, we may be told that the objection applies to some large farms also. Unfortunately it does. But in that case it may be expected that experience will be a teacher. In the case of the numerous small holdings, the absence of hedges is a necessary evil.

If these considerations are duly weighed, it will become evident that the introduction of labour-saving machinery is an element of primary

importance in the economical determination of the size of farms. It is admitted that agriculture is not a subject with which we can afford to trifle or to play. We can afford a smile at the foreign economists who have lately discovered that Peel and Cobden were the gravediggers of England. But that that ill-omened term will justly apply to those persons who seek, by appeal to class-prejudices, or by attempting artificial interference with a set of circumstances which is not in the power of legislation to control, to introduce nostrums in the way of tenure or of culture of land. Each locality, each climate, each soil has its own requisites. Each kind of culture demands its special method. For some culture nothing can compete with the steam-plough. For some nothing can replace the daily care of man, even if that care be only required for the fraction of an hour in the day. All these things require to be known by persons who desire wisely to talk about the land question. And in nine cases out of ten it is not by talking, but by actual facts, that this question must settle itself.

EIGHT YEARS' COAL PRODUCTION.

The late five years have not witnessed that wonderful growth in the production of coal which has been witnessed in similar periods previously; but the maintenance of the output so largely is one of the most remarkable of the records of the coal-trade. Production in the coal trade is often found to creep forward for years, and then to bound. In 1854, for instance, the coal production of the United Kingdom was scarcely 65,000,000 tons, from 2,440 collieries; but in ten years there was an increase of close upon 50 per cent. in the production of coal. Between 1865 and 1870 there was an addition of twelve million tons to the output of coal; but in the next period of five years the increase was twenty-one million tons; and in the later years there has been practically no increase. There have been similar fluctuations in the number of collieries, the tendency being in times of prosperity for the trade towards the opening out of considerable numbers of additional collieries, and in periods of dull trade the output is obtained from as few collieries as possible. In addition to these changes there are others in the proportion of coal contributed to the total by the different producing districts,—changes brought about by the growth of new consuming industries, or by variations in the modes of disposal of the output of the collieries. It may be instructive to carry a comparison over more than five years in this particular, so as to show the effect of the great demand for coal which set in eight years ago, and of the practical retrogression which has for a year been known. Tabulating the returns from the various districts for three years which illustrate the changes fully, we have the following contrast of the productions of the various districts at three periods, as under:—

	1871. Million Tons.	1875. Million Tons.	1878. Million Tons.
Northumberland and Durham	29	32	30
Yorkshire	12¾	15½	15½
Wales	16½	16½	19½
Scotland	15½	18½	17¾
Lancashire	13¾	17	18
Derbyshire	5½	7	7
Cumberland	1¼	1¼	1¼
Notts. and Warwick	3	4	5
Stafford and Worcester	14½	14½	13
Cheshire	¾	½	½
Shropshire	1¼	1¼	¾
Gloucester and Somerset	2	1¾	1¾
Leicestershire	¼	1	1
Ireland	⅓	½	½
Total, with fractions	117½	131¼	132½

This table shows roughly the variation in the output of coal. Between 1871 and 1875 the chief increase in the production of coal was in the northern, the Yorkshire, the Scottish, and the Lancastrian coal-fields, the great bulk of the increase being due, in the three first instances, to the intense demand for iron, and in the latter largely to the prosperity of manufacturing industries in Lancashire. Whilst this growth was going on there was a falling off in the production in one or two coal-fields, such as Cheshire, Gloucester, and Somerset; and it is important to notice that the increase generally in the localities where it chiefly took place was accompanied by a more than corresponding enlargement of the number of collieries. The 117¼ million tons of coal were produced, in 1871, from 2,885 collieries; but 131¼ million tons of 1875 were extracted from 3,933 collieries, so that the increase in the latter was more than that of the production. Bearing in mind the table above which shows the variation in the production of coal between 1875 and 1878, let us now show, in a condensed form, the change in the number of collieries in that time, and the proportion found in each of the coal-fields at the end of the period of prosperity, and at the latest date for which we have official figures. The following table shows in brief the variation in the number of collieries:—

	1875.	1878.
North-Eastern District	347	370
Yorkshire	523	530
Wales and Monmouth	630	567
Scotland	566	534
Lancashire	588	522
Derbyshire	255	237
Cheshire	37	33
Cumberland and Westmoreland	39	34
Notts. and Warwick	77	75
Stafford and Worcester	599	582
Leicester	25	28
Shropshire, Gloucester, and Somerset	194	205
Ireland	53	50
	3,933	3,767

With the exceptions of Northumberland and Durham and Yorkshire we have a decrease in the number of collieries in all the important contributories to the coal output, but in several of the districts there is with that decrease an enlargement of the output, so that the average production of each colliery is raised to nearer what it was seven years ago. The table of production shows that the chief falling off has been in the great northern coal-field, in Scotland, and in Staffordshire; and in every case it may be traced to the lessened production and manufacture of iron. The great iron-making centre of Wales has in the interval developed its export coal trade so greatly that there is not only no declension, but a very great increase in the output. And in localities where that trade is decaying,—in Shropshire and in Gloucester, for instance,—there is a dwindling of the coal trade with that of its great supporter,—iron smelting and manufacture.

In all probability we shall find, when the statistics of the current year are available, that there has been a further fall in the production of coal; and probably it will then be found that the effect of the dulness in the iron and manufacturing trades is overcome. The intense demand for coal raised the production sixteen million tons, and it has now fallen off two million tons, and may again show a declension at the end of the year. It is apparent, also, that one effect of that "coal fever," and of the after-dulness has been to exchange the extent in which the different districts contributed to the total, and it may be said that the change is in the direction of extracting more from the fullest coal-basins. South Wales, which, according to the report of the Coal Commissioners of 1871, has a coalfield holding one-third of the available seams in the kingdom, is increasing its output largely; and in some portions at least of the great northern coalfield there is a shrinkage, owing to the exhaustion or thinning of some of its noted seams. These variations in the yield are to be expected as new fields are developed, or as sources of consumption are altered or find fresh channels of supply. Except in the enlargement of the output there is less change in the coal production than might have been expected; for, in spite of the heavy incidence of the Mines Regulation Act, prices have fallen to the level from which they rose eight or nine years ago, and the wages of the workmen have followed. The number of collieries is also diminished; the tendency which had been marked of the royalty-rents to rise is now checked; and, except so far as profits are now at best precarious, the coal trade may be supposed to have fallen to the low level from which it was raised by the great demand for iron and for manufactured goods. It seems clear that, so far as prices and production are concerned, the full force of the ebb-tide is known, and when any movement shows itself generally, it will be in the nature of recovery, however slight; but in the large amount of unproductive collieries, in those that might be speedily brought into use if the demand justified it, and in the large amount of unemployed labour, there are guarantees that for some time to come cheapness of fuel may be depended upon.

ON THE PROGRESS OF IRON AND STEEL AS CONSTRUCTIVE MATERIALS.

BY MR. J. A. PICTON, F.S.A., LIVERPOOL.*

The working and employment of metals have from the earliest ages exercised a most important influence on the progress of the human race. The ancient poets celebrated in song the golden and silver ages, typifying what was supposed to be the primitive state of innocence and purity of our early fathers; but the real advance and progress of humanity commenced with the use of iron. It would be hardly possible to exaggerate its importance in the economy of human affairs. The employment of iron is a crucial test of the civilisation of any people at any period of history. Without it, art and science are comparatively unknown, and progress, except to a very limited extent, is impossible. With the free use of iron commenced the dawn of the arts of life. Every invention which contributes to material comfort, every pursuit which tends to elevate humanity, is connected with the employment of iron. A little reflection will show that this must of necessity be the case. The progress of man, whether physical, mental, or moral, is intimately connected with his conquest and mastery of the material elements by which he is surrounded. For this purpose no instrument has anything like the potency which belongs to iron. It is iron which digs the mine, iron which ploughs the land, iron which reaps the harvest, iron machinery which grinds the corn. It is iron which fells the timber, iron which converts it into building material or decorative furniture. Every department of industry, every art of life, is dependent on iron. It is iron which out of the rough marble block brings forth forms of beauty and life. It is iron which quarries the stone and shapes it into stately piles of magnificence and grandeur. The exercise of man's constructive faculty to any extent would be impossible without this instrument. What infinite forms of utility or beauty does it assume, from the delicate trinkets of a lady's boudoir, the minute hair-spring of a watch, even a dinner card of invitation, up to the ponderous plating of an ironclad, or the mighty percussive stroke of the steam forge hammer. Nature has placed in the hands of the human race no power so potent as steam, which in less than a hundred years has changed the aspect of the world to a greater extent than in all the ages which have gone before; but without iron the steam-engine would have been an impossibility. The modern developments of the applications of iron surpass all which have gone before, and are daily extending in magnitude and importance. The railway, with its locomotive speeding along with arrow-like swiftness, the mighty steamship ploughing the ocean with its thousands of tons of merchandise, the telegraph wire, like Ariel, putting a girdle round the earth, and annihilating time in bringing together distant regions, are amongst the latest illustrations of what we owe to iron. The object of this paper is shortly to illustrate the development and progress of iron and steel as constructive materials. A rapid glance at their history to the present time may aid us in indicating the lines along which their utilisation in future is likely to be carried.

Few of the material substances of which the solar system and the earth are composed are more widely diffused than iron. It has been discovered to exist in the solar atmosphere and in that of others of the heavenly bodies. As a mineral, it is found in various combinations over a large part of the crust of the earth. It gives its colour to the great Triassic and Devonian systems of rocks. In the living world it is equally diffusive. It imparts its lovely tint to the rose; the flush on the cheek of beauty is owing to its influence. "The ruddy drops that warm the heart" derive their colour from the presence of iron. Abundant as it is in nature, it was one of the latest metals brought into use. Flint and stone during countless ages constituted the implements and tools of mankind, succeeded in the heroic age by bronze, the manufacture of which was carried to a high degree of perfection and beauty.

* Read at a recent meeting of the Iron and Steel Institute.

The earliest mention of iron is found in the Book of Genesis (iv. 22), where we are told that Tubal-cain was "an instructor of every artificer in brass [or bronze] and iron." The Hebrew word is בַּרְזֶל, *barzel*, from a root signifying hardness and strength. We read also of the iron bedstead of Og, king of Bashan, and of Sisera's 900 chariots of iron, 1,300 years before our era.

In the time of Agamemnon iron was not in general use. No implements or weapons of this metal have been found in the remains of Mycenæ or of Troy. A large iron plate, however, has been discovered in one of the Egyptian pyramids. In the time of Homer iron was a rare and costly commodity, more highly prized than gold. The poet never mentions it as the material of armour or weapons, which were entirely of bronze; but in two passages in the "Iliad," iron axes are mentioned as valuable prizes in the athletic games. Iron was not employed for weapons by the Romans before the time of Hannibal in the second Punic war, but, once adopted, the practical genius of the Roman people perceived its advantages, and entered upon its manufacture with avidity. It is not probable that either the Greeks or the Asiatics knew the process of extracting iron from the ore. Both iron and steel are found occasionally in a native condition, principally of meteoric origin. Hence, it is supposed, originated the Greek name for iron, *σίδηρος*, from the same root as *sidus*, the Latin for the starry heavens.

The Romans in Britain practised the art of extracting the metal from the ore on a large scale. Their works were principally carried on in what is now the Forest of Dean, in Gloucestershire, and that of Anderida, in Sussex, in both of which enormous quantities of scoriæ and cinders have been found. Their imperfect methods were unable to fuse the ore so as to produce cast iron, and it is probable that the metal was refined by several processes before it was finally adapted for use. The mines had been previously worked; for Cæsar on his arrival found the Britains in possession of iron, though it was employed more for ornament than use. This imperfect method continued down to the sixteenth century, when the introduction of the blast-furnace led to the production of cast iron, the manufacture of which was for a long time principally fed from the scoriæ and cinder-heaps left by the Romans.

Once adopted, the superiority of iron over every other metal for tools and implements led to the suppression of all other materials for that purpose, and the use of iron entered upon a progressive career, which has extended with the advance of society in an ever-increasing ratio. One of the first purposes to which iron was applied was that of weapons and armour, the manufacture of which attained in the Middle Ages a very high degree of excellence; the hauberks of chain mail of the most intricate and delicate patterns, the chased and inlaid suits of armour, constantly changing its form, exercised the ingenuity of the armourers, and exhibit in the remains left to us a large amount of ingenuity and artistic skill. Offensive weapons were equally elaborated. The Toledo rapier and the Damascus scimitar had a world-wide reputation; and even in England the Sheffield *thwittle* in the time of Chaucer had become famous for its quality. Ironwork at this period was of the most elaborate description. The locks and keys, the hinges and bolts, the smith's work in gates and screens, exceed in beauty anything of the kind which has since been produced. Many specimens remain both in England and on the Continent, amongst which may be mentioned the ironwork in the church of St. Gudule at Brussels, the well-cover by Quentin Matsys at Antwerp, and, though of a much later date, the beautiful park-gates at Hampton Court. The introduction of cast iron into general use in the seventeenth century effected a considerable change in the application of the metal. Its cheapness led to its extended use in the household economy of daily life: fire-grates, stoves, pots and pans, gates, palisades, pipes, &c. This was, no doubt, in many respects a great advantage, but it had a very injurious effect on the art of the smith, superseding skill and ingenuity by the deadening process of routine in cast work, and substituting cheapness for excellence. From the seventeenth century, onwards, the use of iron in works of magnitude became much more general. Wrought iron having to be worked by hand, was necessarily limited in the size and weight of its productions, but cast iron was capable of applications of a more extended character. In 1755, Smeaton first used large pieces of cast iron for mill and engine work. From that period a leading part has been taken in this country in the development of constructions in iron. It has been well said that the triumphs of iron are principally due to Englishmen; they were the inventors of the steam-engine, the railway, the locomotive, iron ships, steamboats, the steam hammer, the telegraph wire, the cast and wrought iron bridges, the ironclads, the monster guns, iron roofs, iron tunnels. One of the first employments of iron on a large scale was in the construction of bridges. In the sixteenth century a proposition was made by Italian engineers to construct a bridge in cast-iron, but the scheme proved abortive. In 1755 an iron bridge was projected at Lyons, to consist of three arches of 82 ft. span. Part of the work was actually prepared and put together in the builder's yard, but from some cause not recorded this attempt was also abandoned, and a timber bridge substituted. In 1777 the first iron bridge in England was designed by Mr. Thomas Pritchard, an architect of Shrewsbury, was constructed by Mr. Abraham Darby, of Coalbrook Dale, and erected over the Severn at Broseley in 1779. The span is 100 ft., the arch nearly semicircular. Soon after this date the idea of constructing bridges in wrought-iron occurred to several French engineers, and several designs were prepared for works at Paris and elsewhere, but they were not carried out. In 1795 another cast-iron bridge was constructed over the Severn, at Buildwas, by Thomas Telford, 130 ft. span. The boldest conception, however, was the cast-iron bridge over the Wear, connecting Monkwearmouth with Sunderland, which was designed by the celebrated Thomas Paine, and was opened in 1796. It consists of a single arch, 236 ft. span, with a versed sine of 34 ft. For grandeur of idea, lightness of effect, and economy of material, it has never been surpassed. From that period to the present, the construction of iron bridges has proceeded in an ever-increasing ratio, until they have come, in works of magnitude, almost entirely to supersede stone. For some years cast-iron bridges had all the sway, constructed either with voussoirs or arch ribs, but have more recently been almost entirely abandoned for structures in wrought-iron. Then followed the suspension-bridge, of which probably the most graceful specimen is Telford's beautiful structure over the Menai Strait. This was originally designed in 1814 to span the river Mersey at Runcorn, on the site now occupied by the railway bridge; but the means were not forthcoming, and the project slept until revived in 1819 for the new site, and was completed in 1825.

The rapid development of the railway system, from its initiation by George Stephenson in 1830, has called out all the resources of the engineering mind, and led to bridges and viaducts of great boldness and skill. One of the most celebrated of these is the tubular bridge over the Menai, having two spans of 460 ft. and two of 230 ft. each. A vast amount of experiment, calculation, and research was expended on this design, which no doubt answers its purpose, but with an expenditure of material and an unsightliness of effect which seems to have deterred others from following in its wake.

The lattice railway bridge over the Mersey at Runcorn, designed by the late Mr. Baker for the London and North-Western line, is a fine specimen of economy of material and efficiency in the result. Specimens of railway bridges abound on every side, and have developed the capabilities of iron to a wonderful extent. The two largest, probably, are the viaduct over the St. Lawrence, which consists of twenty-four spans of 242 ft. each, and the more recent one over the Tay at Dundee. The latter is the most remarkable specimen of iron bridge building which has yet been constructed. It is two miles in length, consisting of eighty-five spans of various dimensions, eleven being 245 ft. between the supports. The construction comprises plate, bowstring, and lattice girders in wrought-iron, with cast-iron columns and piers in combination with brickwork and masonry. These are, however, to be surpassed in boldness of design by that projected over the Frith of Forth, the designs for which are not yet published.

The railway system has given an amazing impulse to iron construction, but it may be said with truth that it is itself the outcome of the development of iron. Consider for a moment what railways have done for the world. Sanguine expectations were entertained at their inception as to the future results, but it is almost needless to say that these expectations have been realised a hundred,—nay, a thousand-fold. What the formation of the grand old highways throughout Europe did for the Romans, the great road-makers of antiquity, the railway system has done for modern society, but in a far higher degree. It has changed the map of Europe; it has altered the boundaries of States; it has revolutionised the art and practice of war; it has given new directions to trade and commerce. Practically it has levelled the lofty summits of the Alps, and reduced the distance between the Atlantic and the Pacific oceans to a mere question of a few days. It has changed the centres of industry, opened up new sources of wealth and employment, created populous towns where existed only desolate wastes, brought the wild beauties of the lakes and mountains within reach of the toiling multitudes. It is gradually softening prejudices, provincialisms, and peculiarities, and paving the way for the access of that coming time,—

> "When man to man, the warld o'er,
> Shall brithers be for a' that."

It is not too much to say that in a very important sense we owe all this to iron and its development. Without iron these expectations would have been an idle dream; with it the results have become a sober reality.

The motive power and initiative of these grand conceptions is the force of steam, harnessed down and pressed into the service of humanity by genius and skill. I have already said that without iron steam-power would have been an impossibility. The progress in each department has gone on *pari passu*. Every improvement in the manufacture of iron has given additional facilities to the steam-engine, whilst steam-power has given an impulse to the production of iron, which has gone on increasing in more than a geometrical proportion. This will apply to all classes of machinery, of which iron may be considered the body, and steam the nervous energy which gives life and motion. The introduction of machinery on any scale of importance is of comparatively recent date, not reaching much further back than a century; yet now we see machinery entering into every manufacture, cheapening the prices of the necessaries, and administering to the comforts, of life. Of all this, iron is the basis and essential element.

Let us now turn to another department, in which, perhaps, more gigantic strides have been made in the use of iron than in any other; I mean its application to naval affairs. The "wooden walls" of Old England were formerly the nation's boast, the "hearts of oak" of our tars was the sentiment of every nautical ditty. All this has passed away like a dream, and timber ships, with the exception of small craft for inland and coasting trade, are as obsolete as the canoes of our remote forefathers.

One of the first to introduce iron into ship-building was Mr. Fairbairn of Manchester, who in 1830 built three iron steam vessels for the Forth and Clyde Canal Company, and subsequently many others for use at home and abroad. The first sea-going iron ship was the *Richard Cobden*, built in 1844, at Liverpool, by James Hodgson & Co.; she was 136 ft. in length, and 522 tons burden, builder's measurement. Some years elapsed before the example was followed to any extent, when by a sudden impulse, and with common consent, timber was abandoned and iron became the order of the day. With the facilities afforded by iron, enormous progress has been made in naval architecture. The *Great Eastern* steamship was built in 1858 on the Thames. Her dimensions are 679 ft. 6 in. in length, 82 ft. 8 in. beam, and 48 ft. in. depth, fitted with screw engines of 1,600 horse power, and paddle engines of 1,000. Probably she was in advance of her time, the skill in her arrangements not being equal to the grandeur of the conception, but the tendency of late years has been to increase the dimensions, particularly in length. The latest development has been shown in the *Arizona* of Liverpool, of the Guion Line, and the *Orient* of London, of the Australian Line, both recently built on the Clyde, of dimensions nearly alike. The *City of Berlin*, of the Inman Line, and the *Britannic* and *Germanic* of the White Star Line, are little, if at all, inferior in size. The *Orient* has a registered tonnage of 5,400 tons, with a displacement of 9,500. Her length is

445 ft. 6 in., 46 ft. 6 in. beam, depth 35 ft. It will be observed that whilst the length of the *Great Eastern* is about eight times her breadth of beam, the length of the *Orient* is nearly ten times her width.

The application of iron to ships of war has probably exceeded the progress in any other department, if we consider the enormous masses of iron employed, and the crucial experiments to which they are subjected. A modern turreted ironclad, with her 10 in. or 12 in. coating of solid metal, her engines of many thousand horse-power, her almost automatic machinery for performing every naval operation, her capacity for destruction in the immense armament she carries, presents a representation of the state of modern society, both in its scientific and social aspects, perhaps as striking and illustrative as can be anywhere found. Closely connected with this is the application of iron to the purposes of war, whether by land or sea. Within the last few years the contest between the aggressive power of ordnance on the one hand, and the defensive power of iron-plating on the other, has been carried to an almost inconceivable extent. The calibre of the gun is increased to pierce the plating, and the thickness of the plating is increased to resist the impact, so that we have arrived at guns of 100 tons and upwards, with projectiles of nearly 1,000 lb. weight, resisted by armour-plates 10 in. to 12 in. thick. At what point the contest is to end no man can foresee. Iron, also, is being largely utilised for defensive purposes by land. At the present time the new fort now in construction for the defence of the river Mersey is to have wrought-iron plates for the protection of the gunners, some of which are 20 ft. long by 11 ft. in height and 8 in. in thickness, weighing 26 tons each. When we look at the ironclads, the rams, the torpedoes, the turrets, the large guns by sea, and the plated forts, the railways, telegraphs, and other appurtenances by land, we see that iron plays an important, perhaps the most important, part in modern warfare.

But whilst iron has thus so largely been employed for the purposes of destruction and defence, on the other hand it has given facilities for mutual intercourse and peaceful co-operation never before known. The railways I have already mentioned; but we must not forget the telegraph-wires which encompass our globe, and form, so to speak, the nervous system of the world. It is iron, and the modern facilities for its manipulation, which enable us so to bridge over space and annihilate time.

The subject is so vast, that I might go on enumerating to an almost boundless extent the various uses and applications of iron, which are constantly increasing in their adaptation to every purpose of human society, but time will not permit. I will only notice the progress of iron in another department, that of building construction. The old materials for building were stone, brick, and timber, and with these, especially the first, some of the noblest monuments of art and skill have been constructed. Iron, in ancient times, played a very subordinate part in building. It is only in modern structures that its advantages have been appreciated. At first cast iron was employed for columns and struts supporting weight, and subsequently for girders and beams, but the treacherous nature of the material when subjected to cross strain rendered its use very hazardous. By degrees wrought iron, by means of improved machinery for rolling, was rendered adaptable for building purposes. A great impulse was given to its employment by the construction of the Crystal Palace in Hyde Park in 1851, in which, for almost the first time, the design was adapted to the nature of the new material. This led the way to further improvements. Rolling-mills were constructed to manufacture girders and joists of lengths and sections not previously attempted, and the result has been the employment of wrought iron to a very large extent in roofs and floors. Concurrently with this progressive movement, the demand for roofs of very large span in railway stations has stimulated design, and led to the construction of iron roofs of a magnitude never before contemplated; the width of span in several cases approaching 300 ft., and the large areas covered, as in the stations of St. Pancras, at Birmingham, and at Lime-street, Liverpool, are such as cast into the shade all former constructions of a like kind.

Iron floors have not in England been adopted to any very large extent, but in France, especially in the new quarters of Paris, they are almost universal. The girders and joists are of rolled iron, with iron laths dropped in between, on which is spread a coating of concrete, rendering the structure perfectly fireproof. Iron lends itself readily to the construction of dome roofs, of which recent specimens are found in the Reading-room of the British Museum, and in the one recently erected in connexion with the Free Public Library, Liverpool.

I have endeavoured in the above remarks to give a rapid sketch of the lines along which the progress of iron construction has been advancing. I will conclude with a few words on the direction in which these lines are leading us.

Notwithstanding the enormous development of railways both at home and abroad, and the depression consequent on excessive and imprudent expenditure, there can be no doubt that the railway system has still a great future in store. There yet remains much land to be possessed. European enterprise will never cease until all the lines of intercourse where commerce finds its way are provided with railways. The adoption of steel for rails, thanks to the genius and enterprise of Sir H. Bessemer, Dr. Siemens, and others, has much facilitated these operations, and holds out to the British manufacturers the prospect of a profitable employment of their capital. Machinery, whether locomotive or manufacturing, is undergoing a constant but quiet revolution, consisting in improved economy of materials, rapidity of motion, and increased efficiency. Iron ships, especially steamships, are increasing in size and power, to which the introduction of steel plates will impart greatly-increased advantages. In warlike affairs, whether the contest between armour-plating and armour-piercing has reached its acme I will not take upon myself to say. The final decision of the problem is one of great interest as to the future employment of iron for such purposes.

The facilities of iron, especially wrought iron, for all engineering constructions are more and more appreciated year by year; but, with some few exceptions, there is a great defect runs through them all in the absence of anything of æsthetic taste in the designs. The ancient motto for building was "Strength, commodity, beauty." The two first have been attended to almost to the entire neglect of the third. This, I cannot help thinking, is a great mistake. The grand engineering works with which the surface of our country is studded should have a dignified and noble aspect. They should minister to the sense of beauty and fitness, as well as to that of strength and power; but too frequently the reverse is the case. I will refer to an instance or two. The railway-viaducts built by Brunel over the rivers at Chepstow and Saltash are grand specimens of constructive skill, but their aspect is repulsive in the extreme. Let any one compare London Bridge, with the graceful curves of its arches and its simple yet elegant design, with the iron bridge of Blackfriars, or, still worse, with the railway-bridges crossing the Thames; the contrast will be found painful in the extreme.

The railway-bridge at Runcorn, by Mr. Baker, with its light iron lattice-work, and the sweeping lines of the viaducts on each side, is a fine and noble structure. Telford's suspension-bridges at Conway and the Menai are charming in their outline and fairy-like in their construction, whilst their neighbours, the tubular bridges, are the very incarnation of ugliness. This is a defect not inherent in the material; for iron readily lends itself to any shape of beauty. It rather arises from contempt or inadvertence, looking at strength and power as the only elements required. Let us hope that a better spirit may be evoked, and that our future engineering works in iron may be as distinguished for beauty of design as they are now renowned for grandeur and efficiency.

In architecture, properly so called, iron is, doubtless, destined to play a very important part. Hitherto architects as a body have neglected iron. When employed they have striven to hide it from sight, and seem to apologise to themselves and the world for being obliged to use it instead of brick or stone. Its use, however, is being forced upon us, and on every side we are met with iron sheds, iron churches, iron houses. The designs of these are usually hideous to behold; but why should this be so? Why should architects not face the difficulty, and instead of letting iron master them, convert it into their handmaid and servant? The Mediævalists followed a different course. They took the material which lay before them, and, by a happy audacity in design, and skill in construction, they produced effects which, for composition of masses, picturesqueness of outline, and brilliance of inventiveness, have ever since been the admiration of the world.

Looking to the future, there can be no doubt that iron is every day becoming a more important factor in the world's affairs. The ages of stone and bronze, the times of darkness and ignorance, have passed away, and with the use of iron came in power, and knowledge, and light. It is destined to work yet greater wonders. It is its mission, sent by a gracious Providence, to lighten man's labours, to give him the mastery over Nature, to enable him to explore her secrets, to comprehend her laws and turn them to the best advantage for the welfare of humanity. The ages of gold and silver may serve for the theme of the poet's fancy or the dream of the enthusiast, but the age of knowledge, and progress, and power, and wisdom is the age of iron.

THE MERCERS' COMPANY'S NEW BUILDINGS IN THE POULTRY.

It will be remembered that the buildings in the Poultry, between Ironmonger-lane and Old Jewry, belonging to the Mercers' Company, were, a short time ago, taken down, in order to admit of the widening of the thoroughfare. The buildings included the sculptured entrance to the Mercers' Chapel. The rebuilding of the premises, as set back, is now in progress, and when completed they will form another addition to the substantial structures which have recently been erected immediately adjacent. The new buildings will have a frontage to the Poultry upwards of 150 ft. in length from Ironmonger-lane to Old Jewry, and will be between 70 ft. and 80 ft. in height, being carried to a depth of nearly 80 ft. at the Ironmonger-lane end. With the exception of the central portion, which is intended to form the entrance to the Mercers' Chapel, the ground-floor portion of the building will consist of large shops, carried up with polished Aberdeen granite piers, and surmounted by arches and spandrels of similar material. The upper portions of the elevation will be in Portland stone, with polished granite window-shafts and ornamentation from the first-floor to the top of the building. The entrances to the upper parts of the building are at the angles of Ironmonger-lane and Old Jewry respectively, and consist of piers and arches in granite.

The entrance to the Mercers' Chapel in the central portion of the elevation will be a prominent feature. In taking down this part of the old structure, care was taken to remove the several pieces of stonework containing the sculpture without injury. The different blocks were laid on the floor of the colonnade leading to the chapel and the hall, in the exact position which they presented to the Poultry before being taken down, where they now remain; and drawings are being taken of them with the view of the whole of the figures and the carving and sculpture being again executed. In the new building the entrance to the chapel from the Poultry leads into a vestibule, the walls of which are faced with carved arches in Dumfries stone, and fluted pilasters of the same material. This again leads to an inner vestibule of larger dimensions, from which the chapel is approached, as well as the hall of the company above, by a staircase on the west side of the vestibule. It is stated that the estimated cost of the whole of the buildings is upwards of 70,000*l*.

Mr. Williamson (architect to the Company) is the architect, and Messrs. Ashby & Horner are the contractors.

Victoria School of Design.—The annual Exhibition of the Schools of Design in Victoria was opened in July, under the auspices of the Technological Commission, in the new hall of the Ballarat Public Library, which was thrown open to the public, for the first time, on that occasion. The following schools forwarded exhibits:—Ballarat East, Ballarat West, Trades'-hall, Geelong, Collingwood, South Richmond, Hawthorn, Brunswick, Clunes, Prahran, St. Kilda (girls), Geelong (girls), Richmond, Hotham, South Melbourne, Coburg, Fitzroy, Talbot, and Sandhurst. The distribution of prizes took place on the 5th of August. The following are the names of the judges:—Messrs. O. R. Campbell, J. M'Kennal, P. Oakden, A. R. Johnson, Von Guerard, H. B. Moore, C. Newbery, Bodycomb, J. Hicks, T. Buncle, and H. R. Caselli.

NOTES ON THE MEDIÆVAL MOOTE-HALL, ST. ALBAN'S.*

Amongst the other antiquities of St. Alban's, the Mediæval Town-house may perhaps claim some attention from those who are interested in the history of the ancient borough. This edifice is mentioned in some old deeds, existing in the Corporation archives, in such a way as to mark its position as far back as the year 1412. The latest of the documents referred to is dated 20th May, twenty-seventh year of Henry VIII. It describes "a tenement with a garden, formerly called two shops, situated in the Flesh-market [*in foro ubi carnes venduntur*], close to Botherlingstok, between the tenement now belonging to Roger Semer, lately to John Yong, on the south, and a tenement called Le Stok-house, otherwise called Le Moote-hall, on the north, and it abuts on the public street [*in regiam viam*] on two sides." In a second deed, dated the 12th of October, fifth of Henry VIII., the same tenement is described as two shops, John Yong being the owner, and it is said to face the king's highway on one side, and Bothelstrete on the other. The building on the north is simply called Le Stok-house. In two earlier documents, one dated the 18th of March, twenty-first of Henry VII., and the other Candlemas-day, fourteenth Henry IV., the same tenement is said to "abut on one side on a certain lane [*quandam venellam*] called Bothelstrete [Bothelestrate]," and for Le Stok-house we have the expression "a certain shop [*quandam shopam*] called Le Stok-house." A glance at the locality will show that these descriptions pretty clearly define the position of the Moote-hall of pre-Reformation times. The tenement, on the north of which it was situated, must have occupied the site of the modern King's Head Inn. The Flesh-market (elsewhere called the Shambles, and the Butchery), is Market-street; and Bothelstrete must be another name for Dagnal-street, or the eastern portion of it; *Dagnelestrete*, however, or *Dagenhalestrate*, is another Mediæval appellation of the thoroughfare (Gest. Abb., i., 472). Thus the Moote-hall of the reigns of Henry IV. and Henry VIII. is identified in site with the old Town-hall, now occupied mainly as the printing-office of the *Herts Advertiser*. And we find it here associated with some curious obsolete names, which it may perhaps be interesting to examine. It is called Le Stok-house; is close to Botheling-stok, and abuts on Bothel-strete, as well as on the Flesh-market. Botheling-stok seems to be named in the deeds as a well-known landmark; and it may perhaps be reasonably conjectured that it was a stock of wood, or stone, marking a point in the boundary line, which runs here between the parishes of St. Peter and St. Alban (once St. Andrew's). The name is suggestive of Saxon times, the word *botl* in Anglo-Saxon signifying "a dwelling," and *botling* "a little dwelling." It is found in several local names, as in Wall-bottle (*i.e.*, the dwelling on the Picts' Wall), in Northumberland; and Bottle-end (analogous to *Tewas-end*), a hamlet in Essex. The appellation Bothelstrete seems to be the key to the explanation of Botheling-stok; it is probably another form of Bottle-street, and means "the street of habitations" (the word "street" by itself signifying simply a paved road, as in Watling-street). It is likely that these names date back to the first establishment of the churches and parishes by Abbot Wulsin (946-955), who, we learn, gathered the nucleus of a population around the Cheaping-stead, or market, and assisted the settlers in building houses with materials and money (Gest. Abb., i., 22). In these times some stock, or stone, might be set up to mark the angle, where the boundary line of the parishes turned in the Flesh-market, and from the locality (Bottle-street) in which it stood, it might be designated as Bottle-stok, or Bottling-stok, with which Botheling-stok is nearly identical. This may be illustrated by reference to a Saxon charter, still extant, dated A.D. 962, by which King Edgar grants the parish of St. Margaret, Westminster (then of enormous extent), to the Abbey of St. Peter (Westminster Abbey). In the recital of the boundaries two of these Stocks are mentioned, thus,—"First from the Thames along Merfleet to Pollen Stock"; and again,—"Following the road to the old Stock of St. Andrew's church."† These considerations suggest an explanation of the term Le Stok-house; it seems probable that the Moote-hall was so called at some early period, as being the well-known house close to the boundary Stok, which perhaps stood against it. This way of designating a public building may be compared with "Christofore by the Stokkis" (*i.e.*, the church of St. Christopher by the Stocks), in Arnold's "Customs of London." The Stokkis here, however, are the penal instrument.

That the Town-house should be called "a certain shop" is somewhat strange. As the word can hardly be a synonym for burgage or tenement, we may perhaps suppose that a portion of the lower story of the Moote-hall was occupied as a shop, or that stalls or shops were erected against it, and so the term was loosely applied to the whole building. (The Mediæval shop-counter was usually outside the house.) It may perhaps be worth noting that there is a stock of very hard stone, at a short distance from the old Town-hall in Dagnall-street; but this, according to information, is not a parish mark, and was once the mounting-stone in the old Blue Boar hostelry close at hand.

The oak skeleton of the existing timber and plaster building (no doubt identical with that which was secured to the corporation by the charter of Edward VI.) is probably as old as Henry VIII.'s reign. Previously, the original Moote-hall may have been rebuilt more than once. The name implies that it was used for mootes, or public meetings (A.S., *Gemot*), folk-motes, or town-motes, in connexion presumably with the government of the town. Such a building, we may suppose, would be required, as soon as the town had any organisation, after public courts ceased to be held in the open air. Abbot Wulsin, and his Saxon successors, may have governed the town by a *reeve* or an *alderman*, who collected the dues, and took care that the abbot's *soc-men* performed their services. There may, however, have been no Town-house till about the Norman period. The Domesday Survey mentions forty-six burgesses who were holders of land, possessing together half a hide (about fifty acres); the Abbot's Vill of St. Alban being rated at ten hides (about 1,000 acres).

The rise of boroughs under an abbey is ably described by Mr. Green (in his "History of the English People"), who says that "The transition from a state of pure serfage to an imperfect freedom was silent and gradual. . . . the first settlers being wholly at the abbot's mercy. Within the four crosses, which bounded the abbot's domain, land and water were his, and folk-mote was held before the abbot's officer, who received the horn, the symbol of office, from him." But in the reign of Henry I., he states of the town which grew up under the monastery of St. Edmundsbury, "Rude as the borough was, it had preserved its right of meeting in full assembly of the town for government, and law and justice were administered in the presence of the burgesses, and the accused acquitted or condemned by the oath of his neighbours." These statements are probably in a great degree applicable to St. Alban's at these early periods. The royal charters of the abbey throw little or no light on the origin of the borough and its customs. The Norman kings simply grant to the abbot and convent "jurisdiction over all men and lands within the town, or borough, and without it [*Super omnes homines et terras infra burgum et extra*]." The charter of Henry II. gives "to the Church of St. Alban the town of St. Alban, with the market, and all the liberty which a borough ought to have" (*villam St. Albani cum foro et omni libertate quam burgus debet habere*). The latter expression would seem to imply a defined borough, having certain privileges, which were committed to the guardianship of the abbot.

Probably as soon as a Moote-hall existed, justice was administered in it by a bailiff (*ballivus*), the general Norman designation of an executive officer. London itself was governed by *baylifs* as late as the fifth year of Richard I., and it may be worth noting that, in the ninth of King John, Hugh de St. Albans was one of the wardens (*custodes*), who were chief magistrates of London in succession to the *baylifs* (Arnold's "Chronicle"). In the reign of Henry I., it appears town-courts, or *hustings*, were generally held every week, and summoned by a bell. In Henry II.'s reign it was probably a part of the duty of the bailiff of St. Alban's to select four jurors for presenting reputed offenders for trial by ordeal, burgesses generally being exempt from trial by battle. After the year 1216, the Town-mote witnessed no more of these sadly grotesque proceedings. Probably the ordinance of the *assize of arms* in 1181 imposed a new duty on the bailiff here, that of reporting that the free-men of the borough were duly provided with the iron helmet and lance, with which all burgesses were to serve in defence of the realm, when summoned. In 1215 we may picture the Stok-house as the scene of a full Town-mote, held for the purpose of "swearing to the great charter," which among its other famous provisions "confirmed to all boroughs and towns their liberties and free customs."

In Henry III.'s reign, we meet with some indication of the corporate character of the town in an incident related by Matthew Paris, from which it appears that the town was held directly responsible to the king for a homicide committed in it. The substance of the story is, that in 1255 Gregory de Stokes, the constable of Hertford Castle, being envious of the warlike reputation of the burghers, made a boast that with seven followers he would enter the Albanian precincts at night in spite of the defences. He did so, but paid dearly for his temerity. A party of the townsmen, headed by a butcher (*Carnifex*), taking the intruder for a robber bent on serious mischief, seized him and his grooms, shackled them, and the next morning struck off their heads, which they fixed on poles (*in terrorem*) at the four extremities of the town. When this was reported to the king he amerced the town in a fine of one hundred marks, which was quickly paid ("Historia Major," Matt. Paris, p. 1640). The amount of this fine, equivalent perhaps to 1,000*l.* at the present day, is some evidence of the prosperous condition of the community who had to pay it, as well as of its corporate responsibility. The abbot, John de Hertford, is not mentioned in the transaction. The apportioning of this mulct would doubtless be the business of some meeting at Le Stok-house. As this was the flourishing period of craft guilds, which, in succession to the earlier Frith and Merchant guilds, had much influence in fostering borough freedom, we may perhaps be warranted in believing that such now existed at St. Alban's, although the evidence is not complete. There was a Fryth Wood at the north end of the town (Gest. Abb., iii., 320), which may perhaps indicate a Frith Guild. A piece of land on the Hatfield-road, toward Beamond's Farm, retained in Charles I.'s reign the name of Little-guild Hill. And *Gylefelde* (Registrum, i., 99), is probably a corruption of Guild Field. For a later period we have the testimony of Walsingham, who relates that "in 1377 a new guild arose, whose patron saint was the protomartyr. When his shrine was carried abroad, the whole brotherhood were bound to follow it in their liveries, twelve of the strongest bearing torches ("Chronicon Angliæ," p. 146). This fraternity is stated, in the document called "Annotations on the Monuments," to have held its religious meetings in the nave of the abbey church, at the altar of St. Mary at the Pillar, and to have been composed of persons both of the higher and middle classes. A high-class guild, whose patron saint was St. John the Baptist, met at St. Peter's Church. And a third, called the Guild of the Holy Trinity, "composed of about 200 men and women of the middle class [*mediocrium*], assembled periodically, with their chaplain, in the north transept of the abbey, where they had church furniture of their own, including a hearse-cloth, or pall, for their funerals." The chapel of All Souls, which existed in the town, is likely to have been connected with some guild; its wardens are mentioned in "Registrum J. Whethamstede," i., 99. The main purpose of these Mediæval associations appears to have been to promote the interests of crafts and trades under the auspices of religion. Those which have been mentioned had ceased to exist in 1428. (See "Altars, Monuments, and Tombs," by Mr. R. R. Lloyd, p. 17).*

* By the Rev. H. Fowler, M.A.

† See Notes on St. Margaret's, Westminster, by Mr. G. H. Birch, A.R.I.B.A.

* To be continued.

The Parkes Museum of Hygiene.—This Museum was re-opened on Wednesday, October 1st, on the occasion of the inaugural *conversazione* of the Medical School at University College. A new and enlarged edition of the descriptive catalogue of the Museum has been issued, and to which we will take an opportunity to refer. The Museum is open on Tuesdays, Thursdays, and Saturdays, free.

PROGRESS AT THE NEW LAW COURTS

The works at the "Royal Courts of Justice," as we believe the new Law Courts are to be officially styled, are making rapid progress, as the wayfarers of the Strand and Carey-street cannot but have noticed for some time past. But the advance which has been made within the last few months can be fully realised only by those who have lately had the opportunity of spending a couple of hours on the ladders and scaffolds, and in the masons' shops enclosed within the flaringly be-postered hoarding. By the courtesy of Mr. F. Clarke, the able and energetic superintendent foreman of masons, such an opportunity presented itself to us on Monday last, and we proceed to jot down a few notes of what was then seen and heard.

There are now about 550 masons employed on the works. They all work until half-past five in the evening, and many work overtime. To pass through the long ranges of sheds, with the men busily engaged at their "bankers," some at work on large corbels or springers, others on voussoirs, capitals, and quoins, or on portions of piers, jambs, or tracery, is to witness a remarkable sight, especially when the approach of night necessitates the illumination of the sheds by hundreds of gas-jets. But the visitor, if unprovided with visor or spectacles of wire gauze, must look out for his eyes, for chips,—among them some rather heavy ones,—fly off by the thousand in all directions. Notwithstanding that the men at work in the sheds are practically at work in the open air, with merely a roof over them, they nevertheless breathe an atmosphere which is heavily and visibly laden with fine particles of stone; yet not one man did we see wearing a respirator.

Of the total of 550 masons at work, seventy are Germans, who have remained on the job since they came over (with about 160 more of their compatriots) to take the places vacated by the English masons by the strike which ended so disastrously for the strikers,—not that all the loss was on *their* side, however. There have been, as will be inferred, as many as 230 German masons employed by Messrs. Bull & Sons at one time, but the majority of them have now left the job, some to remain in England in other employment, others to return to Germany to get married or set up in business for themselves with the savings they had accumulated in England, and many to enter upon the compulsory military service of the Fatherland. Mr. Rees, of Ludwigsburg, an architectural student who had acquired practical knowledge by working at the "banker," and who came over in charge of some German masons at an early period of the strike, under an engagement with Messrs. Bull, was well spoken of for the energy and ability he had shown as foreman over his countrymen. A German workman, who showed marked ability and capacity, has been appointed deputy foreman over his compatriots, who, as would be expected, all work together; but one half of the shed in which they labour is appropriated to British masons, over whom the German foremen also exercise overseership. Things now go on very amicably, we were informed, and if the relations subsisting between some of the German and English masons are, to use a political expression, somewhat "strained," there seems to be no imminent danger of conflict. Rigid discipline has to be, and is, maintained. Many of the British masons employed are non-union men, but unionists, non-unionists, or Germans, they are all first-class workmen, and those who show exceptional skill are, we were informed, advanced as opportunities offer, no matter what may be their nationality or their views as to unionism. The Germans, we were assured,—and our eyesight did not belie the assurance,—are as skilful masons as those whose want of foresight has brought upon them the competition of foreign labour.

It will be remembered that, during the strike, many of the German masons took their meals and slept on the premises; but since the strike terminated the number of Germans at work has greatly decreased, owing to the reasons before stated; and of those who remained, comparatively few stayed on the premises all night. Within the last week, however, the progress of the works has made it necessary that even these few should "clear out" of their sleeping-berths, and they now find lodgings elsewhere. Comparatively few labourers are employed in the masons' shops, the men themselves lifting their stones and turning them upon the "bankers." Labourers are employed in bringing the roughly-shaped stones to the "bankers" and in removing them when they have been worked, and to facilitate this, tramways are laid down throughout the entire length of the shops. The masons also rub their own mouldings. There are over 100 "fixers" and fitters constantly at work, and a number of picked men have been told off for doing the stone vaulting, of which there is a great deal, on staircases and in corridors, besides that of the central hall. We may here add, in this connexion, that some of the corridors, and many of the apartments,—such, for instance, as those below the floors of the courts,—will be vaulted with Messrs. Dennett's concrete material.

The contractors' "plant" throughout is the completest and best obtainable, and there is no lack of it. Without particularising at any length, we may note that the stone-working machinery includes a large number of rubbing-tables, moulding-machines (principally Hunter's patent), large dry-cutting saws (Hunter's patent), saw-frames, and lathes. The whole of this machinery is kept at work until nine o'clock in the evening, the attendants being for the most part labourers who have obtained advancement for intelligence and reliability. The motive-power is furnished by a couple of large boilers and a fine pair of horizontal engines, by Messrs. Wheatley, Kirk, & Price, of Manchester. To facilitate the hoisting of materials and the fixing of the masonry, a large number of overhead travellers are continually traversing the numerous gantries, propelled either by steam or by hand power. These are simple in construction and working, and are supplemented by numerous steam and manual derrick cranes, and steam barrel hoists.

Such has been the progress lately made with the buildings, that many of the courts are now roof-high, and in a short time they will be covered in. We need not here enter into a detailed description of the plan, having previously done so on more than one occasion.* Suffice it to say that the courts are ranged round the great central hall, the vaulting of which has lately been commenced, the main ribs having already been carried upward 9 ft. or 10 ft. from the springing. This work will be proceeded with without intermission, subject in some degree, of course, to the weather. It may be mentioned that the ribs will be in Portland stone, Corsham being used for the filling in. If the coming winter be an "open" one, without long-continued and severe frosts, it is anticipated that before the expiration of 1880, the whole of the buildings, including the central hall, will be ready for roofing. At the present time, the eastern portion of the main block is boarded ready for the slater and plumber, and a few days hence will see the wet effectually excluded from this portion of the buildings. Further, more than half of the buildings east of the central hall are roof-high. West of the central hall the works are not so far advanced, but they are being energetically proceeded with, and with favourable weather a great deal will be accomplished within the next six months. The Carey-street portions of the buildings are well advanced. Such was the severity of the weather last winter, that for sixteen weeks hardly a stroke of work could be done by the masons or bricklayers. To pass from the bricklayers to their work, we would say that the red brickwork in the areas between the courts is well worth the visitor's notice, the whole of the bricks having been manufactured by the contractors, and especially cut to gauge for the arcaded work, which is full of variety in design.

Mr. Street is, we think, to be congratulated on the fact that his work is being carried out by a firm of such enterprise and resource as Messrs. Bull & Sons have shown themselves to be.

We may mention, in conclusion, that Mr. Wallis is the chief clerk of the works, Mr. Moore being his deputy. Mr. Margetson is the foreman of carvers, and the contractors' general foreman is Mr. Thomas Epps.

Birmingham School of Landscape Art.—The annual exhibition of the works of members and students of this society has been opened, in the Lecture-hall of the Young Men's Christian Association, Needless-alley. The exhibition, which is well spoken of by the local journals, will remain open for several weeks.

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* A plan of the court floor was published in the volume of the *Builder* for 1870, p. 666.

THE SIMPLON TUNNEL.

The gigantic tunnel of the St. Gotthard Railway has not yet been completed, and already there is every prospect of the plan of piercing the Alps in a third place being realised. German perseverance and German means were principally instrumental in the construction of the St. Gotthard tunnel, an undertaking deemed at first almost impossible. Now French enterprise is anxious to construct the Simplon tunnel, in order to preserve for French railways the English and Belgian traffic, and to prevent the transmission of the products of Eastern and North-eastern France to Italy and the East, on German lines, through the St. Gotthard.

A Simplon Railway Company was formed as early as 1874, which, in the meantime, has completed the line from Lausanne through the valley of the Rhone to Brieg, at the foot of the Simplon. Men such as Freycinet, Léon Say, Gambetta, and Grévy, are using every effort to remove the many difficulties still in the way of making the construction of the proposed Simplon railway a reality. It is even reported that it is their intention to submit to the French Chambers a resolution by which France will bind herself to furnish to the company a subvention of 1,920,000*l*. On the other hand, it is stated that the Italian Government is willing to connect the foot of the Simplon at Isella with Arona on Lake Maggiore, and the termination there of the Upper Italian Railways, by a line of railway involving an outlay of 1,120,000*l*. We learn the following from the *Archiv für Post und Telegraphie* respecting the tunnel to be driven through the Simplon between Brieg and Isella.

Although the proposed tunnel will be somewhat longer than those of the Mont Cenis and the St. Gotthard, it will be possible to construct it under more favourable circumstances, and work it on more advantageous conditions, than either of its two predecessors. The entrances to the St. Gotthard and Mont Cenis tunnels have both a great altitude; the former 3,779 ft., the latter 5,117 ft., above sea-level. In consequence, it was possible to arrive at the respective entrances only by zigzag approaches, the rapid rise, morever, necessitating the supply of very great traction-power. The Simplon tunnel, on the contrary, enters the mountain chain at a very low elevation. The railway running from Lausanne through the lower part of the Rhone valley is perfectly straight, and has no curves worth speaking of, its rise being in no place more than 1 in 100. At its exit at the southern slopes of the mountain, in the valley of the Diviera, the ascent is, however, steeper, being 13 in 100. As a matter of fact, after the completion of the tunnel, the highest elevation of the line connecting Paris with Milan will be, not at the Simplon, but at some point between Dijon and Lausanne. In consequence, moreover, of the low level of the tunnel, the line will be less liable to frequent interruptions by snow in winter, to which the routes of the Mont Cenis and St. Gotthard are exposed.

Experienced geologists are of opinion that the granite and other intervening rocks of the Simplon are less hard and compact, and that the percolation of water is of a less critical nature, than of the St. Gotthard and Mont Cenis. The Rhone on the Swiss and the Diviera on the Italian side of the tunnel, will supply the water-power required for boring operations, while, thanks to the moderate climate of the canton Wallis, the works are not exposed to the liability of being deprived of their motive power during severe winters, as has frequently been the case during the construction of the two other tunnels.

The Simplon tunnel will be eleven miles and a half long, as compared with the nine miles and one-third of the St. Gotthard, and the seven miles and a half of the Mont Cenis tunnel. It is intended to proceed with the work of boring at the rate of from ten to eleven yards per day. Should this somewhat sanguine calculation be realised, the completion of the tunnel might be expected in seven years, or even less.

As to cost, the estimated expenses have been set down at 3,200,000*l*., of which 2,960,000*l*. would be required for the construction of the tunnel itself, being at the rate of rather over 250,000*l*. per mile. This estimate appears somewhat high compared with the cost of the St. Gotthard tunnel, which is only 152,000*l*. per mile. The sum of 40,000*l*. is set apart for completing the route to the tunnel, and 200,000*l*. for

constructing a great international station at Brieg, similar to that at Modane, on the Mont Cenis Railway.

The financial risk, as far as the company is concerned, is very small. It is proposed to raise only 540,000*l.* by subscription, the other 2,420,000*l.* being furnished to the undertakers in the following manner:—The Federal Government will contribute 180,000*l.*; the canton of Waadt, 200,000*l.*; the canton of Wallis, 40,000*l.*; the cantons of Bern, Freiburg, and Geneva, 120,000*l.*; the Swiss Western Railway Company, which will derive great benefits from the new tunnel, 200,000*l.*; and, finally, France, 1,920,000*l.*

STATUES OF THE REPUBLIC: A COMPETITION.

A competition is invited for the erection of two monumental statues of the French Republic. The designs for the first statue are to be handed in at the door of the École des Beaux Arts (which gives on to the Quai Malaquais) any time before midday of October 6th. On the following day the competitors will proceed to a committee-room at the Tuileries (Pavillon de Flore), and there elect five jurymen. The method of election will be the same as that observed at political elections; if the candidates do not obtain an absolute majority there will be a *ballotage*, and those who have a relative majority will be elected by the second vote. Thus the competitors are left to arrange the selection among themselves, no influence in high quarters will be brought to bear, they can and will select their own judges. The second statue is to be raised on the Rond-Point of Courbevoie, where the bronze of Napoleon I. in his *rédingote grise* was placed when it was removed from the Column Vendôme to make room for another statue representing the founder of the Bonaparte dynasty dressed as Julius Cæsar! The site at Courbevoie will be familiar to all who know Paris: it is the summit of the hill commanding the Avenue de Neuilly and the Avenue de la Grande Armée. The statue will stand in a direct line with the central arch of the Arc de Triomphe and the triumphal arch in the Place du Carrousel, behind the Tuileries. But for its distance from Paris, the site is admirable.

THE NEW DOCK EXTENSIONS ON THE MERSEY.

The annual report of Mr. G. F. Lyster, engineer to the dock works on the Mersey, which has just been issued, is an interesting document, as showing the magnitude of the new docks and extensions at present in progress, both on the Liverpool and Birkenhead sides of the river. The engineer gives particulars of the new dock-works going forward, both at the north and the south end of the port, on the Liverpool side; and here it may be observed that when these works are finished the river frontage of the docks, from north to south, will be between eight and nine miles in length. Among the new works in progress at the north end are a steam dock and its branches, new graving-docks, an extension and deepening of the Canada Basin, and the construction of a new dock, called the Langton Dock. In addition to these works the engineer states that provision is being made at the adjoining Huskisson Dock for the cattle trade, the accommodation to be provided occupying an area of 9,122 square yards; and of this area, 4,531 square yards are covered with sheds and buildings for the reception of cattle from countries not under restriction by the Government. The remainder of the area is also covered with cattle-sheds and buildings specially intended for use as a foreign animals wharf. In this portion there is a slaughter-house, 155 ft. long and 33 ft. wide, with a meat-room over of similar dimensions. The report states that the new works at the south end include a canal dock, a new graving-dock, the enlargement of the Herculaneum Half-tide Dock, and a new dock north of the Herculaneum Half-tide Dock. The works going forward on the Birkenhead side comprise very extensive wharfs and buildings for the accommodation of the cattle trade, these works covering an area of 40,000 square yards. The engineer adds, that the expenditure during the year for dock works at the north end of Liverpool was 347,000*l.*, and at the south end 73,000*l.*; and in addition to the foregoing there was a still further expenditure on new streets, jetties, lairages and slaughter-houses, and landing-stages and approaches, bringing up the total expenditure during the year, on the Liverpool side, to 580,845*l.* The total expenditure on the Birkenhead side was 69,861*l.*

ROYAL WELSH WAREHOUSE, NEWTOWN, MONTGOMERYSHIRE.

The new building which to travellers on the Cambrian Railway forms so conspicuous an object when nearing the Newtown Station, has been opened. The proprietor, Mr. Pryce Jones, having purchased the entire plot of land on the north side of the road, it is intended to lay out the area unoccupied by the actual building as ornamental grounds, which, with the co-operation of the Cambrian Railway Company, who, with Mr. Pryce Jones, are the joint owners of the road, will materially enhance the appearance of the neighbourhood.

The style of architecture adopted is Palladian.

The materials with which the building has been constructed are for the external walls a very deep red brick, from the Garth Ruabon Fire-Clay Works, as also from the Vron Brick-yard, Newtown, the quality of the workmanship being of a good order. The cornices, strings, sills, architraves, and all other moulded work, are of polished Minera stone. The columns supporting the entablature of the entrance portico are of polished red Shap granite, and are each 12 ft. in length in one stone; the piers bear the arms of England, Scotland, Ireland, and Wales, whilst the pediment contains a group representing "commerce" and "industry," which, together with the other carving, has been executed by Mr. Rogerson, of Liverpool.

The several floors are devoted to the different branches and requirements of the trade, each being under the immediate supervision of the heads of departments. The basement, which has a lift to each of the several floors, contains the receiving and forwarding departments.

This floor, moreover, contains the printing-press of the establishment, the proprietor now executing his entire printing.

The ground-floor, which is elevated about eight steps above the street level, has a spacious approach, in harmony with the character of the edifice. Entered through a circular vestibule with marble mosaic pavement are the counting-house and offices for the several departments. The area of this floor is 100 ft. long by a width of 53 ft., and a height of 17 ft., thus forming an imposing room, which is divided into bays by iron columns, supporting moulded timber beams. Round these columns are arranged in a novel manner piles of Welsh tweeds and flannels in stands and cases, each case holding one hundred pieces. The office screen and other furniture are executed in polished baywood and pitch pine.

The approach from this floor to that immediately above is by a staircase, 19 ft. wide, with a central and two side flights of pitch pine, panelled in similar material, with iron balusters of special design, and carved newels, with terminals emblematic of the dragon of Wales. The first floor is devoted to the Welsh shawl department, homespun, and fancy-dress materials. To the second floor is allotted the warehousing of woollen goods and tweeds of a heavy nature.

The contractors for the works and fittings were Mr. Edward Williams, of Newton; for the heavy ironwork, Messrs. Rankin & Co., of Liverpool; the lift is by Messrs. Pendleton & Co.; the heating has been executed by Messrs. J. R. Cooper & Sons; the gas and water fittings are by Messrs. Francis & Co., of Newton; the wrought-iron entrance-gates by Messrs. Freeman & Collier, of Manchester; and the marble mosaic is by Messrs. Burke & Co., of London. The cost has been 13,000*l.*

Mr. David Walker, of Liverpool, was the architect; the late Mr. Wm. Laidlaw, clerk of the works.

The Post in Paris.—The Ministers of Public Works and Posts and Telegraphs have commissioned the architect, M. Guadet, to proceed to London and Berlin, to study the arrangements of the head-offices of the postal and telegraph services in those cities, in view of the contemplated re-organisation of the same establishments in Paris.

PUBLIC OFFICES FOR THE MANOR OF ASTON, WARWICKSHIRE.

The designs for public offices, library, and baths, submitted in competition to the Local Board for the Manor of Aston, were referred by the Board to Mr. Waterhouse, A.R.A., as professional referee, and that gentleman selected the design submitted by Messrs. Alexander & Henman, a view of which we publish.

The Board confirmed the selection, and after some alterations in the arrangements had been made, directed the architects to obtain tenders for the work, the lowest of which amounted to about 22,000*l.* for the whole of the buildings.

The continued depression in the trade of the district has led the Board to determine only to erect the office buildings at present, and, in view of such a contingency, the offices, the library, the baths, and the stables were designed as entirely distinct buildings, each capable of being erected without reference to the others.

The accompanying plans show the office buildings, as altered, with the main entrance in Albert-road. Passing through an open porch and vestibule, a central corridor is arrived at, the principal staircase ascending immediately opposite to the entrance, there being a spacious hall at the intersection of the main corridors.

On the right of the corridor in the front are two offices for rate-collectors, with strong-room. In the other front are rooms for medical officer, two offices for sanitary officer, waiting-room, surveyor's office with strong-room, drawing-office, plan-room, building surveyor's office, &c.

The principal staircase, as mentioned, commences to ascend opposite to the main entrance. The back staircase, ascending from the basement to the attic floor, is by the side of the principal staircase.

On the first floor the corridors are over those on the ground-floor, and here we have offices for the clerk, with large strong-room, waiting-room, the board-room, and another committees room.

The board-room is irregular in shape, being placed at the angle of the building. It will be noticed that it takes the form of the letter V, the board-room being separated by a colonnade and sliding doors from ante-rooms.

In the basement are the housekeeper's sitting-room, kitchen, scullery, pantry, coal-cellar, stores, and so on.

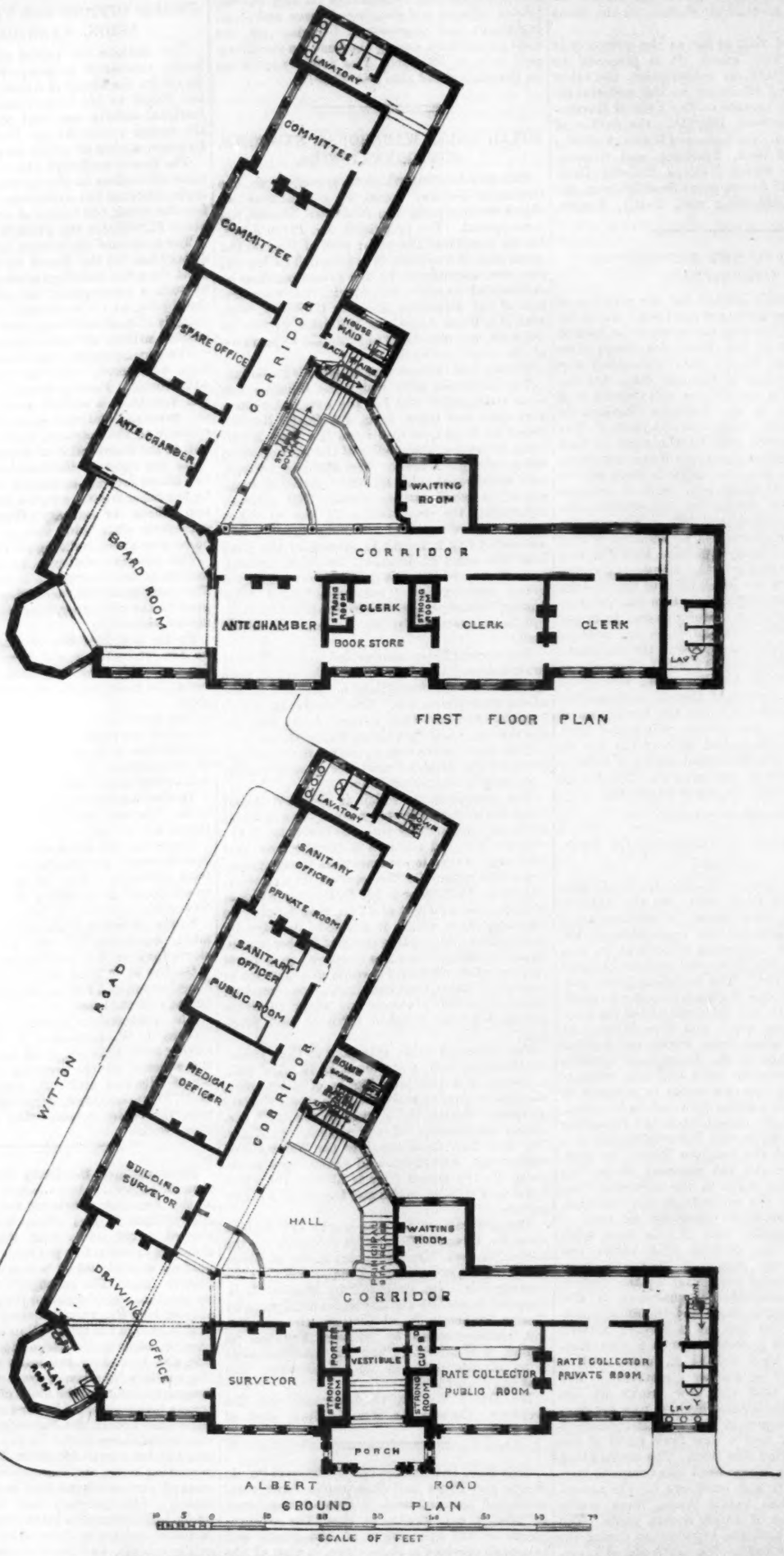
There is a side entrance from the street to the housekeeper's department, and to the yard and back buildings. The lift goes from basement to attics, and is accessible on each intermediate floor also.

In the basement is also the fire-engine department, consisting of two fire-engine houses, stores for hose, &c., and firemen's room.

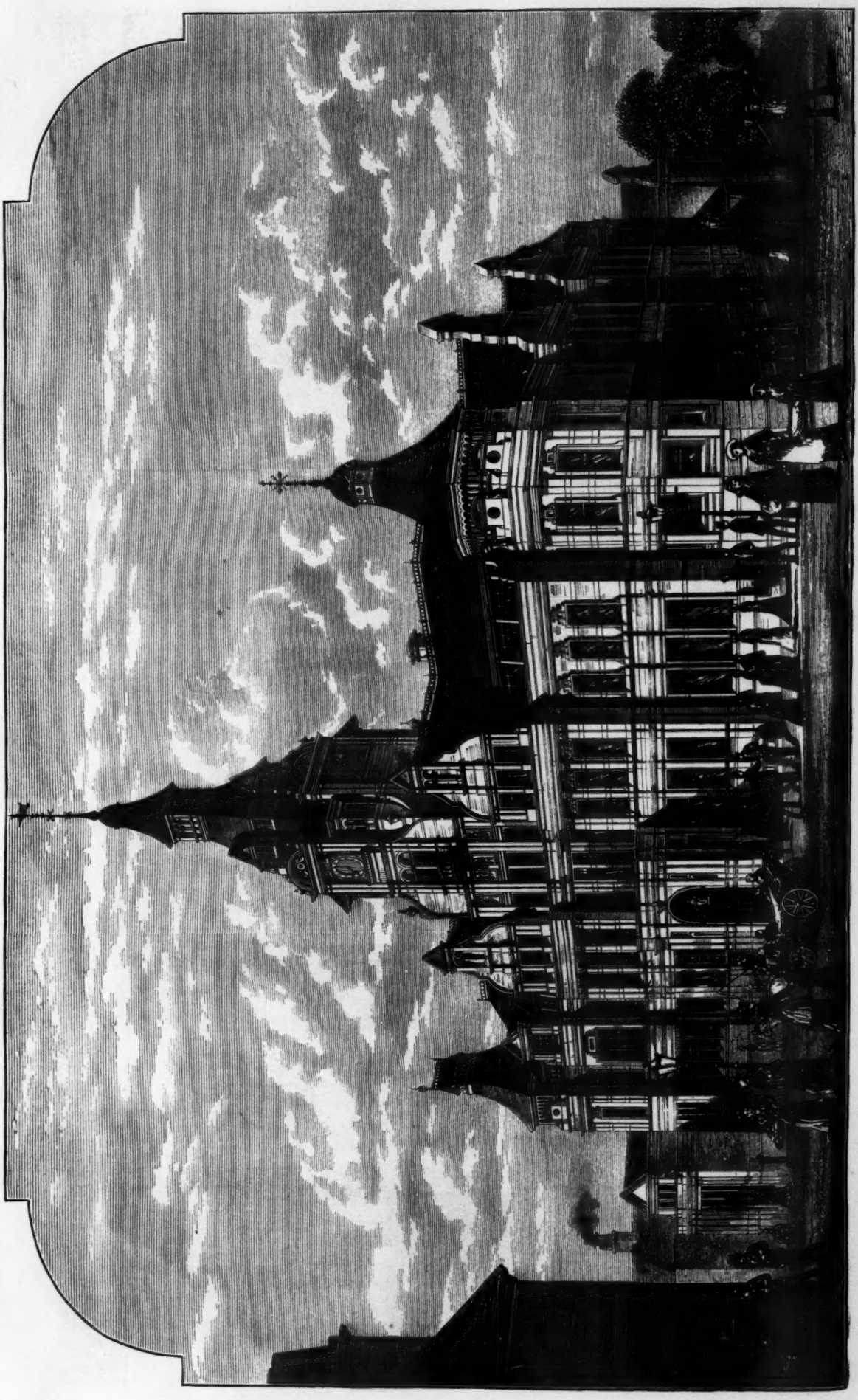
On the attic floor are three bed-rooms for housekeeper, and four separate rooms for clerks, stores, and such like.

The partnership hitherto existing between Messrs. J. W. Alexander & William Henman having been dissolved, it has been arranged, with the sanction of the Building Committee, that Mr. W. Henman, architect, who now has offices at 37, Waterloo-street, Birmingham, shall undertake the entire responsibility of carrying out these works.

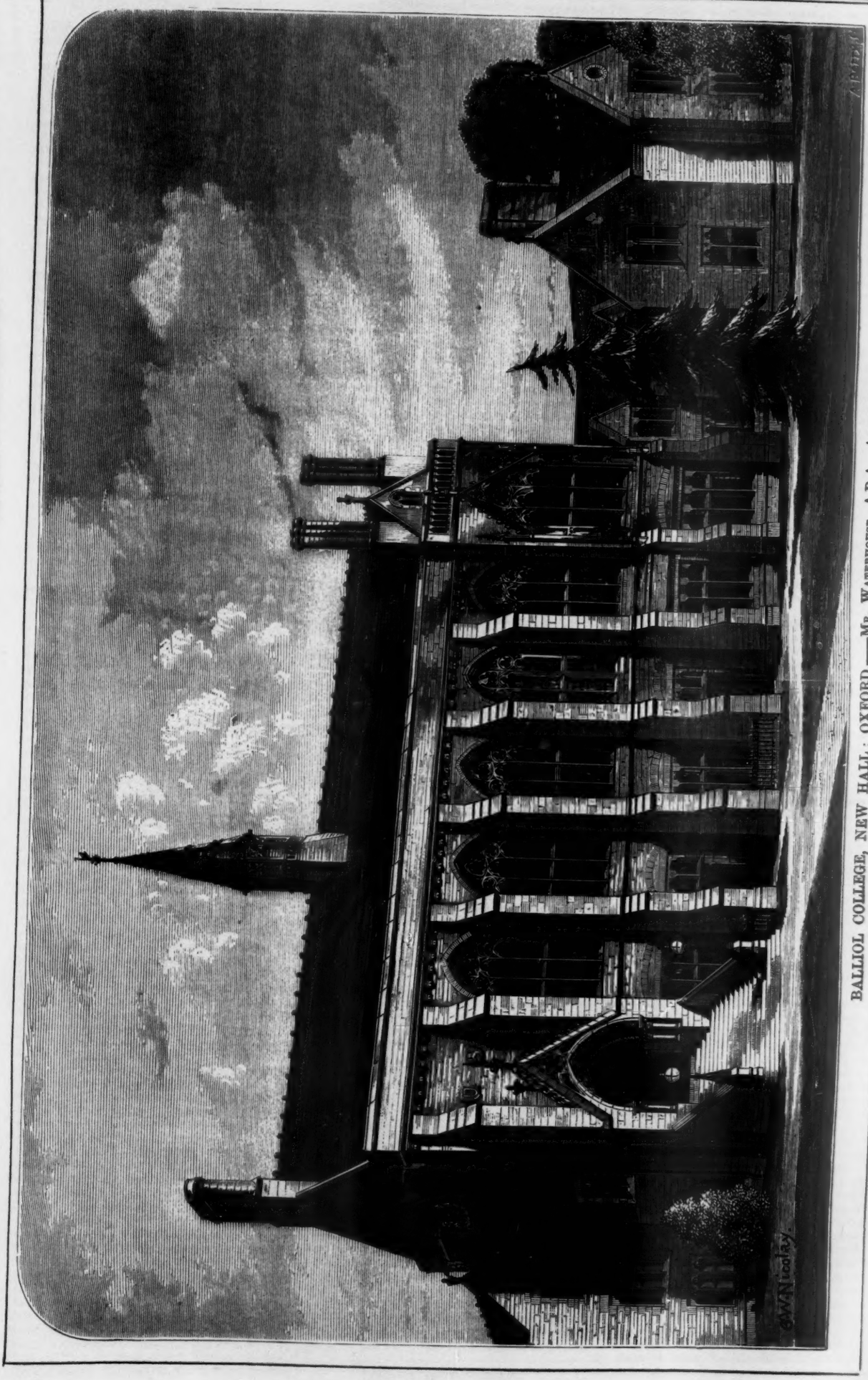
Birmingham Sanitary Supply Association (Limited).—At a meeting of the directors of this Association, held on the 23rd ult., Councillor White in the chair, the balance-sheet showed a net profit that would enable the directors to pay a five per cent. dividend on the paid-up capital, but it was decided to create a reserve fund. The manager's report was read by the hon. sec. (Councillor Sam. Edwards), and showed that there was required an organisation of this kind in the town. Numerous cases of illness had come under the notice of the Association, and houses by the score existed wherein the sanitary appliances were in a deplorably defective condition, the state of the drains and sewers being wretched in the extreme. Many of these were houses, too, for which 70*l.* to 100*l.* a year rentals were paid. In one house nine persons had been seriously affected, in another five, in another three, and in many houses individual cases of serious illness had been traced to the drains. The company had ventilated many public buildings and private residences, and had executed sanitary work for some of the hospitals, public schools, and other similar institutions of the town. It was decided to take steps to issue more shares.



ASTON PUBLIC OFFICES.—*Plans of Building as in Progress of Execution.*



PUBLIC OFFICES AND BATHS FOR ASTON, WARWICKSHIRE. THE SELECTED DESIGN.—Messrs. Alexander & Herman, Architects.



BALLIOL COLLEGE, NEW HALL: OXFORD.—MR. WATERHOUSE, A.R.A., ARCHITECT.

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The new Hall at Balliol College, Oxford, of which we give an illustration, was opened on the 16th of January, 1877. The growth of the college had made the accommodation of the old hall so inadequate that it was resolved to replace it by one much larger, and in doing so to continue the process of repairing and rebuilding the various portions of the college which had been begun some years back and carried on almost continuously.

The structure now under notice, erected from the designs of Mr. Waterhouse, A.R.A., stands at the north end of the college garden on a piece of ground acquired for the purpose, and is in the Decorated style. The stones used were Tisbury and Bath, and the roof is covered with green slates.

The hall (90 ft. by 36 ft.) is on the first floor, and is approached by a flight of thirty steps from the garden. Ascending these you pass beneath an open arch with a pediment above it, the spandrels of which are filled with tracery, into the vestibule, or screens, as it was anciently called, a portion of which has been divided off to form a serving-room. This occupies one structural bay of the hall, and is separated from it by an oaken screen. Above the vestibule is the gallery, following the usual ancient arrangement.

The hall is divided longitudinally into seven bays, all of which, but the westernmost, have two three-light traceried windows, which have internally segmental curtain arches. At the east end is the high table, which is placed on a dais, raised by two steps above the general floor-level. Behind the dais is a piece of high wall panelling, with a canopy the whole width of the hall, and in the centre of this panelling is the door for the use of the Fellows; while, to add importance to that portion of the hall, the lateral windows are more deeply recessed. Above the canopy is a large four-light traceried window.

The roof is somewhat flatter in pitch than was at first contemplated, owing to the necessity of respecting the ancient lights of the adjoining property. It is constructed of oak, and shows its timbers to the ridge-piece. The curved rib of each principal is of the four-centred form, which was dictated by the necessarily flat pitch of the roof, and the spaces between the beams are filled with tracery, to give interest to the framing. The corbels which support the trusses are enriched with shields carved with the arms of benefactors. The hall is surrounded with a dado of oak panelling, which reaches the window-cills. It has two fire-places.

The windows are filled with quarry-glazing, composed of conventional foliage, from the designs of the architect; and in the dais windows shields of painted glass have been introduced, bearing the arms of notable persons connected with the college.

Below the hall are the common-room, kitchen, and offices. Two entrances provide access to this part of the building, the easternmost one of which leads to the common-room (30 ft. by 18 ft.), whence a newel staircase communicates with the dais. Here some fine Jacobean panelling has been utilised to line the walls. It was taken from the old chapel. Next to the common-room is the lecture-room, and thence a staircase leads to a large chemical laboratory. The other entrance leads to the buttery and shop, stores, wine and beer cellars, and to a balcony on the east wall of the kitchen, whence supplies are procured by the college servants, by means of a lift, without in any way interfering with the kitchen. The kitchen is fitted with every modern convenience of the best kind, and close to it there is a large bakery, with a spacious oven, larders, mess-room for the servants, and scullery. There are lifts from the kitchen to the serving-room, and from the buttery to the hall. Below the steps to the entrance-archway is a flight of steps leading to the areas, which give access for tradesmen to the kitchen and cellars.

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These are works of the fourteenth century, and were probably executed just after the completion of the choir. The stalls have been restored to their original position beneath the tower, and the ancient screens erected above them. Only a sufficient length of the latter remained for the north side, and this alone has been ordered by the committee, the funds not being sufficient for the new screen required on the south side. The total expenditure needed for the complete re-arrangement of the choir amounts to between 700*l.* and 800*l.*, of which the committee are only able to undertake a very small portion at present. The base and shaft of the font, of Decorated date, have been restored, and a new marble bowl, agreeing in size with the ancient part, will shortly be substituted for a bowl of mean appearance, belonging to the eighteenth century. The lofty covering of carved wood for the font was designed from an ancient fragment of the fourteenth century wood-work remaining in the abbey. 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At the International Congress of "Americans," held in Brussels last week, Dr. Phené, F.S.A., read a paper in French, entitled, if we translate it, "On Comparisons and Analogues of the Mounds simulating Animal Forms in Europe and Asia with those in America," which was illustrated with a number of drawings and representations of mounds by photographs and other pictorial figures. The author confined himself chiefly to an enumeration of such mounds as he had discovered, together with the principal features of the localities, and such information as might enable other explorers to compare the results of their own investigations with his, and thus, possibly, to arrive at some conclusions, sooner or later, as to the people by whom, or the periods in which some, at least, of these remarkable and little understood emblems were formed. He was bound to give, he said, what was due in every respect, both in point of time and extent of discovery and research, precedence to the great American explorers, Messrs. Squire, Lapham, Davis, and others, the results of whose labours have been from time to time made known through contributions from those authors in the "Smithsonian Contributions to Knowledge," by very carefully-figured representations, and by minute measurements, proving beyond question that these mounds were, for the most part, remains of wonderfully-modelled forms of animals, both as to correctness of proportion and enormous dimension; the most perfect and beautiful of all, probably, being the vast figure of a serpent with a triangular mouth or head, facing a mound

of sacrifice, and which serpent, if its convolutions were unfolded, would measure 1,000 ft. in length. These American mounds simulated a great variety of forms besides that of the serpent; those of quadrupeds, apparently, in some cases unmistakably. Professor Rupert Jones had forwarded to him (Dr. Phené) some time since a sketch of a mammoth or elephant, so figured and distinctly capable of identity; some from the lapse of ages and the effects of rain and weather were not, of course, capable of identity as to the exact animal represented, and consequently they assumed the forms of vast saurians, with flattened or shapeless projections, perhaps originally so formed, perhaps once representing outlines of carefully-modelled members of quadrupeds. There were also birds; some rude outlines which might once have represented the human figure; and other forms besides those of animals, as crosses and emblems, the meaning of which, if perfect, would not at this day be understood, as we know nothing of the people who constructed them.

The author observed that he had not been led to make his own researches from these discoveries in America. At the time he was prosecuting investigations which resulted in the greatest success, he was quite unaware of any such discoveries as those he had just enumerated. He was led to make his inquiries from the question being undetermined amongst British antiquaries, as to whether the serpent was an object of worship with the early inhabitants of Britain or not; and he had nothing to go upon but vague suggestions and semblances drawn from the position of stones here and there on the great moors of England, Scotland, and Ireland, which stones, when they did assume an approach to such device, were generally found to have been removed from their original positions, and must, by the merest accident, have been found as they now are. The only unmistakable form that he could rely on in Britain up to that date was that discovered by Dr. Borlase in Cornwall, and engraved by him in his work on the antiquities of that county. That form was serpentine, and was composed partly of earth forming a mound, partly by stones, so that it was possible that some of the curious positions of stones considered by former antiquaries to have represented the serpent had once done so, that the mounds had been removed for agricultural purposes, and hence the uncertain positions of the stones.

At the same time that he was pursuing his researches, with little or no indications to aid him, Mr. William Simpson,* to whom he was then unknown, and who was at that time as equally unaware as himself of the discoveries in America, and knew nothing of so-called animal mounds or of any such ancient simulations, except those in rude sculptures on the rocks and in caves in India, discovered in China some very remarkable mounds, which, though not in the forms of animals, were curiously enough in forms which happened to have been those which had led him (Dr. Phené) to make his own researches, and had, in addition to this, discovered long winding serpentine avenues leading to the great tomb temples of the Ming dynasty, also in China, both sides of which were apparently guarded by enormous stone effigies of all the larger quadrupeds known in the East. The serpent did not appear,—so far as he was able to discover,—among these forms, but the way was a serpent, the tomb temple being the head, and this, no doubt, was the explanation of that special myth of Chrisna and his followers when he was hard pressed by an enemy taking refuge inside a serpent's head. There seemed no question that these serpentine ways did represent the serpent, as the word "Lung" (pronounced Loong) was equivalent to serpent, and these winding ways were so named, as Mr. Simpson discovered, on inspecting the tomb of the first of the Ming dynasty at Nanking. The same idea was evidently emblemed in the vast simulations of animals in the mounds in America, and these carved simulations in China. The mounds he had referred to as discovered by Mr. Simpson, and as being of the same forms as the forms which had led him (Dr. Phené) to make his researches, were also tombs, and the information Mr. Simpson had given him amounted to this: the mounds placed in the great Necropolis in China over poor men were single cones; those over great and wealthy had three points, the summit being divided into three portions, and near the latter were found large animal forms in stone. Dr. Oliver, a learned writer on ancient customs, had stated that the mountains in Britain were resorted to for the performance of rites connected with the early religion of the land, and that of these mountains the single peak was sacred, the dual peak more so, and the triple-peaked mountain so in particular. On this alone, he (Dr. Phené) had commenced the prosecution of his investigations, and in almost every case of a triple-peaked mountain he had found an animal form, generally that of the serpent, in its vicinity.

Mr. Squire had figured two of the largest forms of serpents in America, as constructed,—the one of earth, in a continuous and solid form, the other of earthen mounds placed at uniform distances, in a curved line, of great length and beautifully symmetrical, simulating a serpent, and each form having the same representations of symbols at the head. He (the author of the paper) had found the serpent in both these forms in Britain. They were each distinctly defined, and in every case they were proved to be sepulchral, from the remains in them. They could all be shown to be of the highest antiquity. In the head of one of those in the solid or continuous form was a triangular chamber formed by three vast blocks of granite, in which were evidences of a grand cremation. Cremation was also, in some instances, found to have been used in the separate mounds, which appeared either to have formed a serpent necropolis, a new mound being formed on the death of each member of a tribe, or one interment of a number of persons at the same time, a separate mound placed over each of so many followers who had fallen with or in defence of a chief of a serpent tribe, so called, or emblemed, as, for instance, the Snake Indians in America are to this day. Both in Europe and Asia he had found such forms, not only like the great serpent ways of India discovered by Mr. Simpson, not only mounds constructed as he had described, but also mounds formed partly of soil or stones, sometimes both added on to other portions of a form, which latter was sometimes cut into shape, sometimes, probably, a mere natural simulation, and in some cases completely natural forms and even mountains, so unmistakably adopted as places for worship of the serpent that doubt as to the cause of selection could not exist, as in the serpentine mountain of Pergamos in Asia Minor, where Esculapius had his grandest temple, and in every such case vast sepulchral remains existed, showing the importance of the spot. These always contained remains of the highest antiquity, in each country in which he had discovered them. He had found them in Scotland, England, Wales, Brittany, and the Pyrenees; also in Greece and Asia Minor, and in the islands of the Levant. In several cases, where the mounds had eluded the notice of treasure-searchers, portions were found where lithic arrangements showed even a careful representation of the positions of the bones of the animal. These discoveries had been made in the presence of many persons, at various periods, and separate accounts had appeared from time to time, in the leading English and Scottish journals. The exact details were proved by photographs taken on the spot, and exhibited to the meeting. Similar additions to natural mounds as well as natural simulations were referred to in America, as Lapham's Peak, &c.

* Special artist to the *Illustrated London News*.

LECTURES IN CONNEXION WITH FREE LIBRARIES.

At the recent meeting of the Library Association of the United Kingdom, in Manchester Town-hall, the following paper on "Lectures in connexion with Free Libraries," by Mr. W. H. Bailey, member of the Salford Free Library Committee, was read. We endorse it, and send it into circulation:—

The subject which I have ventured to bring before this Congress is, the more beneficial use of the free libraries of the large towns of this country. Can we, by any means, increase the value of these libraries to those for whom they were established?

Of late years, among municipal governors, there has been an increasing higher and nobler conception of civil life; and it seems to me that if we want evidence of this civilisation we may find it, not only by observing the sanitary wisdom exhibited in the streets and lanes of the town, but we may go still farther to the source of this wisdom,—to its ultimate cause,—and receive evidence from the silent witnesses on the well-stocked shelves of the town's free library. According to the number and respectability of such witnesses so shall our verdict be. A free library in the manufacturing districts is the working men's university; and this is becoming more definitely so than it was a few years ago.

Let me make this clearer. Twenty-five years ago the suburbs of Manchester were a mile and a half from this building, and there existed very few of what are known as "lock-up shops"; the shopkeeper lived on the premises, the merchant resided not very far away, within walking distance of his warehouse. But now, every day at sunset, the sole inhabitant of the town is the artisan. The small manufacturer is rapidly ceasing to exist. Articles are not now made; they are manufactured. Men are not required to pull at the oar; they are wanted to hold the rudder. Our works are now huge places. Division of labour and the right o scientific use of force will continue to make their dimensions increase. The capitalist lives in the country, and the workman lives near the factory. Railways, telegraphs, tramcars, all assist at this process of disintegration.

A writer on the United States says that in Boston "the purse-proud people are said to herd together more than anywhere else, and scarcely associate with any but their own class." "Such a city," Plato would have said, "must necessarily become two cities, the one composed of the poor and the other of the rich, dwelling in constant conspiracy one against another." We have no fear of a condition like this; but we all know that much of the fierce conflict between labour and capital would be leavened by wisdom if we had less dense ignorance of commercial laws among the contending parties. Some may think that this alteration of the character of the populations of our large towns may not exactly be within the scope of our inquiry; yet, as our main object is to diffuse knowledge, it seems but proper that anything that tends to lower the mental vitality of a town should be worthy of our consideration. This phase of the question should give more zest to the educationalist, and a clearer conception of duty to those citizens who earn their wealth in the towns, but who spend their money and their leisure elsewhere. If we choose, we can make our noble free libraries active, living, moving, and breathing factors in our national education. "A man," says Carlyle, "has not now to go away where a professor is actually speaking; because, in most cases, he can get his doctrine out of him through his books, and can read it and read it again and again, and study it. I don't know that I know of any way in which the whole facts of a subject may be more completely taken in, if our studies are moulded in conformity with it."

"Books," says Hazlitt, "we owe everything to their contents on this side of barbarism." Books are being manufactured by the ton; even the man of culture, who may be familiar with the roads and lanes down which to direct his walks, is often perplexed at the infinite choice, and much time is lost in making the best selection. Life is short, and that sort of labour, bewildering as it is to the man of letters, is somewhat an appalling maze to the young man who has but just mastered the mere rudiments of education. We have in our free libraries the requisite tools of great value. How shall we make them available and more known to those who are anxious and willing to use them? How shall we make the books more accessible, their exact value in relation to each other more apparent? How shall we guide the student from the worthlessness of some of the misleading paste, gum, and solder encyclopædias to those books which add to the world's store of knowledge? The value of these questions will be still more apparent when we consider that many of the books in our libraries are only useful as indications of the state or measure of the knowledge treated upon up to the time of their publication, mere milestones of mental progress, sometimes registers of ignorance. The intellectual hurricane which has swept over the world during the last fifty years, the great increase in the number of critical investigators in every department of thought, the new discoveries, the rejection of the false and the finding of the true, all inform us that in a library a good guide becomes a more important personage as years roll on.

The late Sir James Simpson, the eminent physician, in alluding to the advancement of learning in that branch of which he was so distinguished a member, said that "so great

had been the progress in his own time, that the class-books used by him as a student were useless to him in middle age." Is it requisite to give instances where our own experience furnishes abundance of them? That the free libraries of Manchester and Salford are highly appreciated by the public is evident from the yearly reports issued by the committees, showing that their users number hundreds of thousands. I do not hesitate to say that the libraries are not doing all the valuable work they might do, and to assert that so long as they fall short of this, so long will they fail to fulfil their mission,—that mission wherein to fail, however much or little, is lamentable in proportion to the nobleness of the end in view. Is not that truly a noble mission whose object is to supplement the education of the public schools, to offer to all the means of attaining that mental and moral enlightenment which thus far has seemed to be the birthright of the rich alone, but which is now within the grasp of any who may desire it? But is this mission being fulfilled? I fear not. From the figures given in their last reports by the Free Libraries Committees of Manchester and Salford, I find that in Manchester the number of books borrowed during the year 1876-7 was 513,019, of which 287,722 were novels. The number of books borrowed from the Salford Free Libraries during the same period was 242,962, no less than 200,308 of these being novels. From these figures it would therefore appear that in Manchester considerably more than half of the books read were works of fiction, whilst in Salford the difference between these works and the solid literature reaches the extraordinary proportion of five-sixths. That some good may be derived from the perusal of novels is unquestionable. The boy who reads "Robinson Crusoe" will later on read Livingstone, Burton, Baker, Wallace, and other great travellers. Thackeray, Dickens, and Trollope have created an atmosphere in which corpulent beadledom, humbug, and imposture cannot breathe. By all means let good English novels be read. I wish to be emphatic in giving this opinion, as I have been charged with looking upon light literature with some indifference. Permit me to say that the man who, in poetry or fiction, can perform surgical operations on social deformities shall be my Johnson, and I will be his meek and lowly Boswell. Caricature has done something for mankind. *A scientific sneer is of more value than an armourclad.* It is, however, evident that these libraries are not accomplishing that educational mission which is the root idea of their establishment. Until we have more reading of useful and refining literature, the full measure of their public utility will not be gained. Among the many ways by which the public value of our libraries may be increased, there is one which, I venture to believe, would be highly beneficial, and that is the establishment of lectures in connexion with them. The books are there on the shelves; they are also catalogued; and the catalogues can be purchased for a small sum. So far, good. But this is by no means all that is necessary. A library must have a catalogue as a lock must have a key, and the better the catalogue is the more serviceable will the library become. But a catalogue, however good it may be, will still leave much to be desired, if it is to be made purchasable by the public. It cannot undertake to distinguish the useful from the trashy in books, nor group together all that is lying hidden in them on any particular subject. It cannot indicate courses of reading for those who desire to improve themselves in, it may be, a score of different ways, nor can it do much to assist the specialist. Yet, unless such information as this is supplied to the readers, no just impression of the capabilities of the library can be conveyed, and, therefore, the full extent of its usefulness cannot be attained. As this information cannot be supplied by means of the catalogues, it follows that there is need of some other method of showing to the public what the library's possessions consist of. I believe that the best method of doing this would be to make every library a basis for a series of lectures on the books which it contains. These lectures would require a definite subject; but instead of being treatises on that subject they would be authoritative estimations of the exact value and usefulness of every book on the subject which the library possessed. They would point out those books which related its history, its origin, growth, and development in modern times; those which would give that general *resumé* of the subject which every fairly-educated person would be anxious to possess; those which would carry the reader, or the student, on to more advanced and exact knowledge; those which would cast collateral light on the question; those which contained the latest conjecture or discovery; and so on, according to the requirements of the subject chosen. We should thus obtain by degrees courses of reading in every branch of literature which, if afterwards inserted as an appendix in the catalogues, would be the most valuable and useful commentary on their contents that could be made. The Free Libraries Act and the Libraries Amendment Act, I believe, give sufficient power to local authorities to spend money for the purpose I have named; indeed, although in Liverpool and Wolverhampton the library committees are not working in the direction I have indicated, the public rooms in those towns, I am given to understand, are free to lecturers who work in connexion with the libraries. The details of the scheme would vary in each particular district. In most towns there are public rooms in the same building in which the books are stored. At present sums varying from 2*l.* to 5*l.* a night are charged for the use of these rooms, even for educational purposes, and where there has been no charge for admission.

In these days, fifty to one hundred and fifty thousand pounds per annum are spent with composure for the annual maintenance of the police and the workhouses of a town. Contrast this with the amount spent in any town on free libraries and education, and let us ask ourselves if we have arrived at what Herbert Spencer called knowledge of differences. It sometimes seems to me that we have not even got past that primitive stage which enables us to grasp the difference between a pebble and a boulder stone.

As an employer of labour in many ways, I am not afraid of foreign competition in these districts under even unequal conditions.

I claim for the people here the possession of those qualities that have made this country great and free; there is work yet, but it requires not the figures of statistical societies to tell us that in these bad times the man who goes first to the wall is the man of the little brain, of no imagination, and whose untrained faculties perpetually mortgage the morrow. "In the sweat of the brow is the mind, as well as the body, to eat its bread." Bearing in mind this saying of Archdeacon Hare's, I can congratulate those men who with divine ambition have created free libraries in our large towns. They have done much good, and I am confident that the spirit of humanity, which impelled them in the past, does not sleep; and I feel that, if there be any value in what I have said, some beneficial result will follow.

We have plenty of work to do yet, not only to enable us to hold our own against foreign rivals in trade, but also to enable the dwellers of the cottages to use this beautiful world in a respectful manner, and to taste some of its sweets, which can only be done by the study of those refinements of life which are to be found in the arts of peace.

NEW DEEP-WATER QUAY AT QUEENSTOWN.

The first concrete block of the new deep-water quay at Queenstown was lowered into its position, in the presence of the Mayor and Corporation of Cork, on the 4th ult. The quay will be 600 ft. long and 40 ft. wide, and the estimated cost of constructing it is 30,000*l.* The event was one of the most important that has taken place within the city or harbour for many years, and great commercial advantages are expected when the work is completed. At the lowest state of the tide there will be 27 ft. of water, and this will enable Transatlantic steamers to come alongside at any state of the tide, and discharge into the wagons of the railway company, thus getting rid of the obstacle which always prevented Transatlantic steamer companies from loading and discharging at Queenstown. In the construction, about 140 concrete blocks will be used, each 20 ft. in depth and 8 ft. in thickness, and 12 ft. frontage, weighing close on 120 tons each, and as these blocks are made at a wharf a considerable distance from the proposed quay, it was necessary for the contractor to have floating sheers to carry out the work. The block was lifted at the wharf and suspended about midway in the water, then floated to its position and lowered. The floating-sheers, with the machinery for lifting, were designed and constructed by Charles Powis & Co., of Millwall Pier, London. The hull is 90 ft. long, 32 ft. wide, 9 ft. 10 in. deep fore, and 13 ft. 10 in. aft. The sheer-legs are fixed at the fore-end, together with powerful pulley-blocks and chains for raising and lowering. At the after-end of the hull are constructed six water-tanks, capable of holding 150 tons of water, to act as a counterbalance to the block. To these tanks a centrifugal pump is connected, so that they can be filled when raising the block, and emptied when lowering it, and by this means the hull can, at all times, be kept on an even keel. The machinery consists of a locomotive boiler, and a pair of 8-horse power horizontal engines, connected by gearing to two drums, each 7 ft. long by 4 ft. in diameter, and strong chains pass over two powerful pulley-blocks which are attached to the upper part of the sheer-legs, the lower pulley-blocks being fitted to massive forged beams, the ends of which are slotted out to receive the lifting-bars, and by this means the huge block is suspended from four points and kept perfectly level. The engines drive a pair of screw-propellers, which considerably assist in working the sheers into position.* The whole machinery worked most smoothly, and the massive block was lowered with an ease that gave great satisfaction to all concerned. Subsequently the divers went down and saw the block laid in its proper bed. The engineer is Mr. P. Barry, and the contractor Mr. J. Delany, of Cork; whilst Messrs. Charles Powis & Co., as already said, supplied the machinery.

A FIND AT POMPEII.

On the 24th ult. the 1,800th anniversary of the destruction of Pompeii was celebrated in the buried city, and the day was made additionally memorable by such a revelation of the treasures still awaiting the investigator as will never be forgotten by those who were present. The *Times* correspondent gives the following graphic account of this remarkable find:—"The opening ceremonial ended, a bell rang to summon people to the excavations. In different parts of the ninth region ten chambers were to be opened and their contents revealed, and there was an eager rush from all points. It is impossible to describe the intense expectation on every face as the first picks struck the ground, or the scene around each place to be excavated. Crowds were pressing round every opening; people were perched all along the tops of the broken walls to the eminent peril of their limbs, and groups were thickly gathered along the higher unexcavated level, and on every other point of vantage. Each room to be excavated had been cleared of the upper falling-in, leaving about 4 ft. to be removed. The indications given by the preparatory work in one of the larger rooms having been particularly favourable, I took my station there, and witnessed in the course of three hours, as the various objects peeped forth from the scoriæ one by one and were taken up, such a revelation as I shall never forget. For the first five minutes there was a breathless silence as the men worked, then, as the scoriæ fell away, part of a green object became visible. In a moment the workmen's hands had cleared the space around it, and amid deafening cheers a small bronze horse, 9 in. in length, was held aloft. Then a large amphora appeared; then two bronze vases, one with handles; then a large iron key, and as each in turn was lifted high for all to see, '*Bene! bene!*' burst in a chorus of hearty satisfaction from the people. A list, with the briefest description of the things which then followed in rapid succession, would fill a column. There were at least a dozen bronze vases of different shapes, sizes, and uses, with and without handles, and in one a number of bronze coins oxidised together, and many other coins were found at intervals during the excavation. There were many handsome bronze fibulæ, several bronze bracelets, a number of rings, many terra-cotta vases, tazze, and amphoræ, and a remarkable number of little terra-cotta water-cups for bird-cages, various kitchen utensils, a spit, forks and knives of iron, a bronze bottle, a number of little bronze bells, a dagger with ivory handle, a knife with ivory handle, a bronze casserole, and a terra-cotta money-box." Among other remains, a splendid bronze candelabrum was come upon. In short,

* We will give a view of the Sheers in our next.

from noon till three o'clock a continued succession of objects were revealed. In one room a skeleton was found, and in the smallest chamber opened four were discovered huddled together.

THE SOCIAL SCIENCE CONGRESS IN MANCHESTER.

The twenty-third annual congress of the National Association for the Promotion of Social Science was commenced on Wednesday in the new Town-hall, Manchester, under the presidency of the Right Rev. Dr. Fraser, bishop of the diocese, who delivered a very able inaugural address. We quote a few passages:—I invite you, then, to consider with me some of the problems involved in the social condition of great cities; and I shall illustrate my positions, as I severally take them up, mainly by facts and figures supplied by Manchester, about which I know more than about any other great city. Within a radius of five miles of this place of our meeting there must be aggregated a population of probably 750,000 persons, of whom about 370,000 would be in Manchester, 170,000 or 180,000 in Salford, and the rest in suburban townships with local self-government,—still called villages in Lancashire, though in the south of England they would be considered of importance enough probably to be represented in Parliament. For some of the necessaries of social life,—such as gas and water,—these suburban districts are indebted to the great central municipalities, Manchester and Salford, with which they are locally connected; others, such as education and relief of the poor, they provide for themselves; but still, for practical purposes, the whole may be regarded as one great, but imperfectly organised, community. It is already so large and so complex that I should regard with positive dismay the prospect of any considerable accession to its numbers or magnitude. The distribution of the population in these great industrial centres is peculiar, and seems to follow a kind of law, and is an important element to be borne in mind when we are considering the social condition of the people. Things have undergone an almost entire change in the last half-century. Fifty years ago the wealthiest merchants in Manchester lived in the heart of the town, in streets in which to-day there is not a single gentleman's residence. Tradesmen lived over their shops; manufacturers found existence tolerable under the smoke of their tall chimneys, surrounded by the cottages of their workpeople. The suburbs which now stretch out their long lengths, or are dotted with handsome detached villas on every side of Manchester, did not exist. Life, perhaps, was rougher and less refined; but there was more contact of class with class; more intercourse and sympathy between masters and men, fewer of those chasms across which we make many futile attempts to throw bridges, and which constitute sometimes such insuperable difficulties in the way of large and effective schemes of social improvement. Distance is an important element in the problem of moral, as well as of physical attraction. Never was the proverb so true as to-day, that "the one half of the world knows not how the other half lives." Now, all these conditions are changed. You will hardly find one of our wealthiest men living within two miles of his place of business or of the Exchange. The shopkeepers have migrated into the suburban townships. The centre of the city at night is a mass of unoccupied tenements. The working class and the poor still cluster thickly together in some of the murkiest and dismallest quarters of the town, with nobody, perhaps, living among them above their own social level, except the doctor and the clergyman; and though we are slowly trying, and to some extent successfully, to remedy this evil, in too many parishes, and those the very poorest, there is no parsonage-house, and the clergyman not unnaturally prefers to locate himself and his family where he can see the sun a little oftener, and breathe a purer air. A large proportion of the working class, however, under the pressure of recent street improvements, which have been going on so extensively amongst us for the last ten years, have, like the rich and well-to-do, migrated to the suburbs, though not to the same suburbs, and if the houses which are provided for them by speculative builders at the high rent of 5s. or 6s. a week were a little more roomy, and of a more solid construction, and erected under stricter sanitary regulations, the change no doubt would be beneficial to all concerned. But, speaking generally, in those suburbs the working class still dwell, as a class, apart, and are even further removed in distance from their employers than before. While the houses have seldom more than two bedrooms, so that it is almost impossible to bring up in them a large mixed family with due regard to health and decency, and, being built outside the boundary within which the fear of the Manchester Corporation's excellent regulations prevail, they are often so flimsy of construction, and put together with such unseasoned materials, and erected with such supreme contempt of the recognised conditions of a healthy life, that a change which might have been of great social benefit to the class concerned has been a change of very questionable advantage indeed. Still, these are the facts of the case in most of our great centres of population; and a most important body of facts, in their social consequences, they are. They are the conditions, partly physical, partly economical, and partly moral, under which the problems of society are to be worked out, if possible, to their true solution. . . . . Good health in towns may be said to depend on four primary conditions,—a good water supply, good drainage, good air, well-constructed and wholesome homes. I would premise that a great number of misleading ideas lurk under what I may call the "fallacy of averages." By the exertions of the two corporations I believe that the death-rate in Manchester and Salford has been very sensibly reduced, and does not now exceed much more than 20 or 22 per 1,000 under normal circumstances; and for some time past we have been wonderfully free from epidemic or infectious disease. But, as I have often heard the late Mr. Cawley, M.P. for Salford, who, from his knowledge as a civil engineer, could speak accurately on the subject, state at meetings on sanitary subjects, that while the rate of mortality in Higher Broughton, the salubrious level on which he and I lived, did not exceed 10 or 12 per 1,000, there were courts and alleys in Salford where it would rise as high as 60 or 70. And you lose this disparity of facts when you come to strike an average, which of course does not represent any actual fact at all. The chief difficulty in dealing with these great and important questions affecting the public health arises from the fact that municipal bodies and local boards rarely attack the evil till it has become intolerable; and, when they do attack it, they find it encumbered with so many vested interests, or acquired rights, that it is almost impossible to deal with it effectively, except at a cost which is enough to frighten them from dealing with it at all. It is this difficulty that has rendered the Act for preventing the pollution of rivers in many places practically inoperative. . . . I am not quite sure to what extent the masses of our working classes in Manchester are gainers by that displacement to which I have already referred, and by which they have been compelled to migrate from the centre of the town to the suburbs. Externally, and while the houses are new, the gain looks considerable, and, of course, it is an immense benefit to the health and also to the morals of the community that the corporation have succeeded in closing, I believe, every one of the cellar dwellings, which once existed by hundreds, and which were centres of disease and, partly as a result of the unhealthy conditions under which the people lived, of vice in so many forms. But, an instructive pamphlet, entitled "Urban Leaseholds," does not give a very cheering picture of these modern suburban "houses made of half-baked clay and mud and compo, with raw shrinking timber, gaping joiner's work, foul chimneys, unsound roofs, damp basement rooms, and inefficient drains." "Ædiles," says the pamphlet from which I have taken this quotation, "are everywhere wanted. Not merely the existing public surveyors, but officers armed with effectual powers to prevent the erection of all dwellings unfit for human habitation, and to make fit those now unfit, at the expense of the owners and builders. Deterrents should be raised against bad buildings." All I say is, for goodness sake do not let us have a new set of officials. Arm those who exist already with effective powers if they do not already possess them. I know from my own personal experience that our two corporations are vigilant in this respect; but an extract that I will presently read from a communication that I have received from the admirable medical officer of the Manchester Corporation is enough to show that more is required to be done in this direction. I am afraid that just now, owing to short time and want of employment and diminished wages, a good deal of overcrowding could be discovered in Manchester, for the sake of saving rent and fuel and gas, two and sometimes three families crowding into one tenement, which under ordinary circumstances would only be occupied by one. There is a difficulty in knowing how to deal with such cases, to which the poverty, not the will of the people, is consenting. It would be harsh, and might be impossible at such a crisis, to enforce the usual regulations; and the most that can be done till good times return seems to be to exercise a more than ordinary vigilance to prevent the outbreak of anything like epidemic disease in consequence of such overcrowding. It is one of the frequent cases in which necessity must be allowed to break away from the control of law. I spoke just now of a communication which I have received from Mr. Leigh, the medical officer of the Manchester Corporation, in which he summarises the work effected by the health committee, which was appointed about ten years ago, and under its energetic chairman has been fruitful of good results to the city . . . Mr. Leigh concludes his interesting letter with a few highly instructive remarks. Coming from an officer of his ability and experience, I commend them very earnestly to the attention of the Congress. "The points," he says, "to which I would specially call attention are, first, by legal action and the provision of adequate inspection to secure a better class of houses for the residence of the poor. The houses in the centre of Manchester, extending over an area of more than 600 acres, have been so far removed for the improvement of the city and the exigencies of commerce, that the dwelling-houses only number on an average nine to the acre over this space. The remainder of the city, up to its boundary, is now nearly covered, so that any considerable increase of houses for the working-classes connected with Manchester must be erected in the suburban districts. At present, the houses, as a rule, rise directly from the surface of the ground, without any intervening air space. The walls are excessively thin, and the mortar of the poorest quality. Such houses are necessarily damp, and must be productive of rheumatism, heart disease, and bronchitic affections. An air space at the basement should be insisted on, and means adopted for preventing the rise of moisture into the walls, which should be thicker and of better quality."

The following items were on the programme for Thursday,—

Health Department.—Paper by Mr. A. Haviland on the question, "What are the evils resulting to health from the growth, outside the boundaries of municipalities, of suburban districts, without due regulation and control?" By Mr. Baldwin Latham, on "The Influence of sewage irrigation works upon public health"; and by Mr. C. Estcourt, on "The pollution of the air."

Art Department.—Paper by Mr. G. F. Watts, R.A., on the question, "What is the effect of amateur influence upon art progress? What subjects are most suitable for the pictorial decorations of public buildings in this country, and with whom should the selection rest?" By Mr. T. C. Horsfall, on "By what means can workpeople in large towns be induced to buy examples of good art?" and by Mr. J. H. Balfour Brown, on "Artistic copyright."

BEDFORDSHIRE ARCHITECTURAL AND ARCHÆOLOGICAL SOCIETY.

At the last monthly meeting of this Society, Canon Haddock, one of the honorary secretaries, reported upon a recent discovery made at Sandy, which was brought to his notice by Mr. Leeds Smith. In excavating for sand on "Tower-hill," west of the Great Northern railway near Sandy station, two leaden coffins were found side by side, at a depth of from 3 ft. to 4 ft. below the surface,—one measuring about 6 ft. and the other 5 ft. 6 in. in length, and each about 14 in. wide.

On the 16th ult. the members had an excursion into Northamptonshire. Journeying from Bedford to Wellingborough by train, the party drove thence to "Chester House," close to the Roman camp near Irchester, where they were met by the Rev. R. S. Baker, rector of Hargrave, who, five years since, before the Northamptonshire Society, read an elaborate description of the vessels and coffins found the previous year

by the ironstone diggers in the cemetery outside the camp, and who last year took a prominent part in conducting the diggings made under the auspices of that society around and on a portion of the camp, the results of which he now explained to the company by the aid of a plan, exhibiting at the same time a large collection of building stones, some of them apparently portions of a temple, sculptured figures, an upper and lower millstone, and other relics of this ancient and military occupation, which are for the present kept in an outhouse of the farm. Canon Haddock having acknowledged Mr. Baker's kindness and the valuable information he had given, the road was taken for Irchester Church. Here the vicar, the Rev. J. Monk, who had joined at the camp, led the way to the interior, and proceeded to read a paper on the history and leading features of the fabric. In the walk round he called attention to the remains of a fine priest's doorway, lately discovered beneath a monument on the north wall of the chancel, the erection of which apparently accounts for its having been blocked up. Portions of the rood-screen have also been recently found hidden behind the sides of hideous square pews, several of which still disfigure the nave, and form a striking contrast with the excellent original open seats. Next on the list was the much-admired church of Rushden, upon which the vicar, the Rev. J. F. Barker, made some remarks, inviting attention to the restoration being carried on under the direction of Mr. Gordon M. Hills, architect, London. The unusual richness of detail characterising this church, not only in the lofty tower and tapering spire, but in every part of the building, justly takes it out of the category even of Northamptonshire churches. Whether (says the *Bedfordshire Times*) the curious "straining arch," which spans the nave, and has now for safety's sake been repeated within the tower arch, really adds to the general effect or detracts from it, seems an open question. After a hasty luncheon at the Green Dragon, Higham Ferrers, the church and its adjuncts, the grammar school, and Beds. House were successively examined, the Rev. A. J. Forster, of Farndish, in the absence of the vicar, acting as conductor. Visits were subsequently paid to Irthlingborough and Finedon churches.

THE DANGEROUS STRUCTURE IN THE HAYMARKET.

At the Marlborough-street Police Court, on the 26th ult., the hearing of the adjourned summons taken out by the Metropolitan Board of Works against Mr. Jesse Fagg, of 29, Haymarket, for permitting a portion of his premises to be in a dangerous condition, was proceeded with before Mr. Mansfield, the magistrate. Some particulars of the case have already appeared in the *Builder*.*

Mr. Grain appeared for the Metropolitan Board of Works; Mr. Tatlock for the Civil Service Supply Association, the owners of 28, Haymarket; Mr. Houghton for Messrs. Kirk & Randall, the builders; Mr. Bingham and Mr. Green for Mr. Fagg.

Mr. Charles Sewell, architect and surveyor, who was cross-examined at the previous hearing, was re-called, and in re-examination by Mr. Bingham stated that since the last hearing he had seen the party-wall in question and was not able to discover any new cracks, neither could he see that the old ones had extended. The internal supports of the archway were amply sufficient to sustain it, without the use of the external shoring, which latter was useless, as it was bearing no weight.

Mr. William Harvey, called and examined by Mr. Bingham, said he was an architect and surveyor, of eighteen years' experience. Had personally examined the party-wall both on Mr. Fagg's side and on the side belonging to the Civil Service Stores. In his opinion the wall was not dangerous, and was not likely to fall. The bricks were in fair condition, and the mortar was hard. The absence of footings to the wall did not necessarily render it a dangerous structure. The shoring of the arch was sufficient, and when the works in progress on the other side of the wall were completed, such shoring could be removed with safety. Assuming that there was a bulging of the wall to the extent of 3½ in. at a height of 30 ft., that would not, in his opinion, constitute an element of danger.

Cross-examined by Mr. Grain, witness admitted that the absence of footings to a wall was a defect constituting an element of danger under certain circumstances. If the wall were in the condition described by Mr. Woodthorpe, the absence of footings would render it dangerous. The bulge in the wall was a defect, but it was not an element of danger.

Re-examined by Mr. Bingham.—The old party-wall, in point of fact, was considerably thicker than it would be if rebuilt in accordance with the Building Act, and its extra thickness would compensate to some extent for the absence of footings.

Mr. Thomas Hovenden, examined by Mr. Bingham, said he was an architect and surveyor, of twenty-five years' experience. At present the alleged dangerous structure was in no danger of falling. The bricks were fair in quality, though they were not pressed bricks, and the mortar was very fair. The wall bulged in part at the east end. Had examined the wall of the arch and found it was 14 in. thick. The disrepair and irregularities of the wall did not constitute elements of danger which would lead a practical man to suppose that the wall was a dangerous structure.

Cross-examined by Mr. Grain.—The earth and rubbish at the foot of the wall on the Civil Service Stores side could be removed with perfect safety, and the works of the new buildings proceeded with without danger to the workmen of Messrs. Kirk & Randall. If the earth were removed, the wall would stand perfectly safe for any reasonable time.

Mr. Worthington, examined by Mr. Bingham, said he was an architect and surveyor, of thirty years' experience. Had examined the party-wall in question, and found it to be in a very fair condition on Mr. Fagg's side; but on the Civil Service Stores side it had been very much neglected, and had been carelessly treated in the course of taking down the old buildings at 28, Haymarket. The bricks and mortar were in very fair condition. The bulging of the wall was not so serious as to render it likely that the wall would fall if not shored. The shoring of the arch internally was more than sufficient, and could be removed with perfect safety on the conclusion of the building operations next door. Was convinced that the arch was of more than 4½ in. work. The wall was perfectly safe, and the vibration of the engine used to hoist the materials would not be sufficient to cause it to fall. The wall might, in the eyes of a novice, be dangerous, but not in the eyes of an experienced practical man.

Cross-examined by Mr. Grain.—Did not consider Mr. Woodthorpe a novice.

Mr. Goodchild, examined by Mr. Bingham, said he was an architect and surveyor, of twenty-five years' experience. Had examined the wall in question on both sides. Had found a slight bellying or bulging in it, but that was not an element of danger. The wall was, in part, in a bad state on the side of the Civil Service Stores, the joists having, apparently, been roughly torn out of it when the adjoining building was demolished, instead of being sawn off; but the damage so done was worse in appearance than in fact.

Mr. Smith, examined by Mr. Bingham, said he was a surveyor, of twenty-seven years' experience in London. Had seen the cracks and bulge in the wall, but did not consider that they constituted elements of danger. The wall was not at all likely to fall.

By the Magistrate.—Attributed the bulging of the wall to its age and to some slight settlements.

Mr. David Thomas Child, called by Mr. Bingham, said he was an architect, of thirty-five years' standing, and, as a surveyor to a fire office, had had great experience as to dangerous structures. Considered the party-wall and the arch perfectly safe.

Mr. Shepherd was the last witness called. Examined by Mr. Bingham, he said he was a builder and contractor, of twenty-two years' experience, and he had had a great deal to do with pulling down and re-building old party-walls. It was by no means an uncommon thing to find old party-walls without footings. In his opinion, as a practical man, he did not believe that the wall would fall if the shoring were removed. The shoring had been imperfectly done, but it was unnecessary.

At this point the case was adjourned until Saturday, when the magistrate,

Mr. Mansfield, in giving his decision, observed that Mr. Walker, the District Surveyor, appeared to have greatly misunderstood the decision which he (the magistrate) had come to when the case was lately before him on another summons. Mr. Walker had no doubt very great and important responsibilities to bear in fulfilling his duties as District Surveyor, but it did not necessarily follow that, because a magistrate refused to condemn an alleged dangerous structure, the professional reputation of the District Surveyor was impugned. The magistrate had to administer the law, and before he could order the demolition of a wall or other structure he must be convinced, by the evidence adduced, that the structure was dangerous. Just as there were said to be some "mad doctors" who were too ready to pronounce everybody whom they examined to be insane, so there might also be architects and surveyors who would too hastily condemn old party walls or other structures. He, as a magistrate, had to go by the evidence, and Mr. Sewell's evidence on the occasion of the hearing of the previous summons was so strong and emphatic that it induced him (Mr. Mansfield) to pause before he acceded to Mr. Walker's request to order the demolition of the structure. It was not denied at the hearing of the former summons that the wall was shored up, and that there was no immediate danger, and the decision which he (the magistrate) then came to had been completely verified in the result, for the building had not fallen down. The matter had now, however, come before him in a different form, and much additional evidence had been adduced on both sides. That additional evidence had been given, he felt sure, with the most perfect candour and honesty by both sets of witnesses, and therefore, in giving his decision on the case, it must not be supposed that he meant to reflect upon or to discredit the witnesses called by the side against which he was going to decide. There was no dispute as to the facts of the case. The whole of the evidence consisted of opinions, and the opinions given on each side were diametrically opposed. He had come to the conclusion that the structures were unsafe, although it might not be capable of mathematical demonstration that they were dangerous. Mathematical proof was not always obtainable. People were convicted of various offences against the law on circumstantial evidence; why, then, should not an alleged dangerous wall be condemned in the same manner? He felt bound, for the public safety, to order the demolition of the wall.

Mr. Green, on behalf of Mr. Fagg, asked that the order might be made under the 73rd section of the Building Act, which provided that the work was to be done to the satisfaction of the District Surveyor, or that of "such *other* surveyor" as the Board might appoint.

The Magistrate, however, said he had every confidence that Mr. Walker would act impartially in the matter, and the usual order would be made.

On the part of the Metropolitan Board of Works, an application was made for costs; but

Mr. Mansfield said he could not entertain the application.

* See pp. 1035, 1049, and 1068, *ante*.

Sir,—This case is now ended,—in the only way which was possible from the first,—an order for the dangerous structures to be taken down.

It is not for me to comment on the evidence given by other architects and surveyors as to what constitutes an *element of danger* in a structure, though I certainly heard some singular opinions on construction during the trial; but I can, without hesitation, assert that *not one* of the witnesses on the other side would have taken the responsibility of giving a certificate that the structures were safe *without the shores*.

An unfair attempt was made to try and prove that I had an animus in the case. My reply is, that I suggested to the parties that they should secure the structures under an award, and I held the dangerous-structure notice over *for three weeks* on my own responsibility, and it was not till Mr. Sewell, Mr. Fagg's architect, wrote me a threatening letter, requesting me to get the adjoining builders to shore up his client's house, and till I heard that Mr. Stevenson's singular award said that an overhanging party-wall without foundations or footings, resting on sand, could be raised, that I took any steps in the matter.

I may add that Mr. Fagg walked into my office just before the first day of trial, cheque-book in hand, and wished to know how much I wanted to help him in the case.

Robert Walker.

Fleet-street Improvements.—We hear that the Improvement Committee of Commissioners of Sewers, to whom it was referred to do what was necessary, in view of the contemplated raising of a building on the site of the premises lately removed to the corner of Bell-yard, Fleet-street, have determined to serve the usual notice for compulsorily setting back the frontage so as to be in a line with the New Law Courts.—*City Press*.

THE COMMISSION QUESTION AT GREENOCK.

We have already mentioned the endeavour made by the professional referee in the Greenock competition to obtain a revision of the Town Council's arrangement to pay the successful competitor 4 per cent. for his services as architect, instead of the customary 5 per cent. The following is a copy of the letter on the subject which was addressed to the Provost. It may be usefully considered by other public bodies who are proposing to effect a saving by cutting down the architect's honorarium:—

"Now that you have my report, and before the names are known of the authors of the designs I have recommended, it seems the right time for me to write to you on the subject on which I had some conversation with you while at Greenock, viz., the offer of the Town Council to pay the architect (whoever he may be) of the new buildings only 4 per cent. instead of the usual and well-recognised 5 per cent.

It is true that the said rate of 5 per cent. is to some extent an arbitrary one, as it is good remuneration in some cases, and a very unremunerative one in others; as, for instance, in small works with much detail or special contrivance in them; but it has been long accepted as the most convenient arrangement, so that both architects and employers know exactly the results of their connexion. Unless, therefore, some very strong reason exists for a departure from it, any departure is, I venture to think, most unadvisable, and calculated to lower the feeling of responsibility of the architect, or, if he is not strictly honest, to tempt him to accept from indirect sources that which he may well consider his legitimate right; while, on the other hand, the very fractional difference of 1 per cent. on the cost of a building can be no important saving to the employer. I am, of course, well aware that inasmuch as fifty architects sent in designs well knowing that 4 per cent. only was offered, the successful one will be bound to accept it as a condition of his employment; but may I suggest that such reasoning is not likely to commend itself to a public body, who must desire not so much to save a small sum of money as to maintain the position professionally of the gentleman into whose hands, as their architect, they must confide so much?

May I further suggest the parallel case of a patient seeking advice important to his health at the hands of a physician, or a client consulting a solicitor on matters which may affect his position in life or his personal honour? In neither of such cases would it be thought possible to offer less than the recognised fee. It is surely the same with an architect, who holds, as it were, the position of trustee between his employers and the tradesmen employed, and whose duty is equally to see that the former is not wronged by overcharge, and the tradesmen are fairly paid for the work they do.

Now, in the Greenock buildings there is evidently no reason for thinking they will call for less than usual professional skill and professional knowledge; indeed, they require more than the average of these qualities, for they are far from simple, embracing as they do many very separate requirements, and because the building has to contain accommodation for many very diverse purposes.

In a memorandum issued, the Council say they find that many and large buildings have been executed in the neighbourhood of Greenock where the architect has been contented to accept 4 per cent. I cannot, of course, suppose that these have been otherwise than honestly dealt with, but it may well be that the times of great depression through which we have passed for some years, and are still passing, may have induced or compelled professional men to accept less than their ordinary commission; but this again will, I am sure, be felt an unworthy argument for such a public body as the Greenock Town Council to use or act upon.

Let me, then, as a perfectly independent person, but as one thoroughly acquainted, from the experience of many years, with the working of my profession, urge the Town Council (before any names of competitors are known) to do the graceful act of reconsidering their first impressions, and to announce that, on considering the whole subject, they are ready to pay the architect they employ the usual commission of 5 per cent.

I made some inquiries while in Greenock of the cases in which 4 per cent. had been paid to the architects, and as far as I could learn they were cases of comparatively simple buildings, such as factories, warehouses, Board schools, and the like; all buildings of far less importance, and involving far less labour and responsibility, than must be the case with the new Municipal Buildings.

I have to ask your pardon for thus intruding, as it were, unasked advice, but I hope you will think that anxiety for the due honour and professional status of all members of the profession to which I have devoted my life and an active experience of thirty years, is a sufficient justification.

Charles Barry."

PURE WATER FOR SWINDON.

Under the above heading we noticed at the time* a report of the Directory of the Swindon Waterworks Company, Limited, submitted to their shareholders on the 4th of February, 1878, in which they announced their having entered into a contract with Mr. J. H. Porter, for the application of his patent (the Porter-Clark process) to the softening and filtration of the water-supply of Swindon, adding that they "felt that, having the supply of this increasing town under their control, it is their duty and their best policy to give the inhabitants the purest water in their power."

Certainly, we may well wish that this sense of duty on the part of the directors of the Swindon Waterworks Company were emulated and acted upon by some others, elsewhere; and it is satisfactory to read in a local journal, the *Wilts and Gloucestershire Standard*, that thanks to "the liberal hand with which the company has grappled with the difficulty," "the very acme of perfection has been at length attained." The supply is described as being exquisitely pure and bright for drinking; soft, and everything that the most fastidious can desire for the tea-pot or the wash-tub, and for all those other domestic uses for which water is the essential element. It is further "explained, for the information of all caterers for public health," that the mode of so effectually purifying and softening what is naturally good and wholesome water, is the "Porter-Clark" process, of which, together with the original process of Dr. Clark, we gave a very full description in our issue of December 15, 1877, in connexion with works then being carried out at the County Asylums at Banstead and at Chartham.

We are glad to know that after two years' experience of the working of this process at those asylums, the visiting justices of Kent and Middlesex have recently, by resolution and by certificate, expressed their satisfaction with the process as having answered, down to the present time, the purposes for which it was intended. The water from the deep wells in the chalk at Banstead and Chartham is of 16 deg. and 17 deg. of hardness, and reduced by the softening process to 3½ deg. The water supply of Swindon is still harder, and being collected from springs at the surface, in an open reservoir at the foot of a wooded ravine, the degree of hardness is more or less modified by a varying quantity of surface water, which brings with it varying quantities of earthy and vegetable matters rendering filtration necessary.

As we explained on a former occasion already referred to, by Mr. Porter's combination of softening with filtration, he utilises the pure precipitate of carbonate of lime itself as the medium of filtration; and when viewed in relation to waters containing vegetable or other organic matters, it is agreeable to know that this pure medium is constantly renewed, the cloths of the filters being, by a very simple and neat arrangement, removed altogether with their adherent deposit, and speedily replaced by clean ones. There is no half-measure of scraping or brushing in place, but the cloths are quickly removed, and have their interstices rinsed free from everything. Once the people in charge have acquired the skill that comes of habit, the operation of tending the filtering machines is very easy, influenced, of course, by the degree of impurity in the water.

The Porter-Clark process has an important sphere of usefulness in manufactories, where space is commonly so valuable, and where the waste of fuel by the incrustation of steam boilers amounts in many cases to more than 1,000 tons per annum, not to speak of the cost of periodically chipping off the calcareous non-conductor with which the boiler is lined.

We understand that Mr. Porter's system is in course of being erected at the works of the Indiarubber and Telegraph Company at Silvertown, to the extent of treating continuously, night and day, 12,000 gallons of water per hour, within a space above the pumping engines of 40 ft. by 30 ft.

At the paper-mill of Mr. Lloyd, at Sittingbourne, and at the sugar-refinery of Mr. Duncan, in London, experience, we are told, has evidenced its value for industrial purposes, and upon a large scale; and in these days of dearth and of competition in trade it is well to know how a profit may be saved if it cannot be gained.

* February 2nd, 1878.

A NOTE ON FACTS AS TO LONDON WATER-SUPPLY.

Sir,—The subject of the water-supply of London is one with which it is especially dangerous to meddle, without full knowledge of the facts of the case.

No one doubts the importance of giving to every Londoner a supply of the best attainable water at the lowest possible price.

But few people know either what are the facts of the case, or what is being done in the way of improvement. First, as to

cost.

Water now costs almost exactly 6*s.* 6*d.* per annum for every unit of the London population. This cost is thus made up:—

	s.	*d.*
1. Interest and dividend on capital...	4	0
2. Pumping and filtering	0	10
3. All other expenses	1	8
Per head, per annum ...	6	6

The first item arises from a division of 6·58 per cent. per annum on the average capital. This is considerably less than the statutory dividends. The precedent for compulsory purchase of water stock is that of the award on the Stockton and Middlesbrough Corporation case. This gave twenty-five years' purchase of statutory dividend, *plus* 45 per cent. for compensation. Compulsory purchase of the London Water Companies, on the principles now laid down, would therefore raise the first item of 4*s.* her head to 6*s.* or 7*s.* per head.

With regard to pumping and filtering, the only change contemplated would be to increase the cost of filtering.

With regard to other charges,—on which Mr. Fawcett proposed to save 100,000*l.*, or 6·3d. per head,—that gentleman should be told that this sum is rather more than the *whole expenses*, including directors' fees, except what goes under the head of "maintenance." He therefore proposes to collect water-rates, and carry on all office-work, for nothing!

The working costs vary from 21·3d. per head, in East London, to 49d. per head, in the Grand Junction district. It is possible that some economy may be effected in some districts. But this can only be done, not by blending, but by further *dividing* the management, so as to divide the supply according to zones of level, as is done by the New River Company.

quantity.

The supply of 32 gallons per head per diem, throughout the year, rising to 37 in the hottest months, is now regarded as *too ample*, rather than too small.

By the introduction of a constant supply, this quantity may be reduced by about one-half. This would save 5d. per head per annum in pumping and filtering. But the cost of the new fittings would involve an extra cost to the owners or occupiers of 13d. per head. So that extra cost would fall on *some one* for this change.

quality.

The average quantity of solid matter in the London water supply, *taken from the mains*, in 1877 was one part in 3,500.

In the water pumped from deep wells or the chalk, in Kent, the quantity of solid matter is *one part in* 2,500!

The water of the three companies which take their water from the Thames at Hampton, is not distinguishable by chemical analysis from that of the two which take it from the Thames at Molesey. It may be desirable to take the supply of the former three higher up; but there

is no distinct chemical or medical evidence to show that this is the case.

The report of Dr. M. Tidy to the Society of Medical Officers of the Board of Health, gives analyses of the water *taken from the mains* of the different companies, which yield the above results.

The real source of the chief pollution of the water is IN THE CISTERNS from foul air, blacks, and absorption of gaseous matter.

The remedy is, constant supply as far as possible; abolishing cisterns; and medical INSPECTION.

But as neither dividend nor political capital is to be made in this way, it is only the real sanitary reformer, who has studied the subject, who will lift up his voice in the matter.

Out of 563,000 houses in the companies' districts, constant supply is now given to 128,704, of which 76,853 have been so supplied since October, 1873. The *onus* here does not lie on the companies, but on the house-owners and occupiers, who object to the expense of changing their fittings. C. E.

THE ORGANISATION OF EMIGRATION.

SIR,—As the subject of *emigration* will, in all probability, force itself more and more upon the attention of the Legislature, a few suggestions in reference to its organisation may not be inopportune; for emigration on a large scale, without organisation, would only aggravate the misfortunes of the emigrants.

One of the first needs of the unemployed workman is a record of the excess and deficiency of labour in different localities, not only in England, but in the colonies. Information of the kind required, with regard to these latter, might be obtained from the ever-obliging agents-general; and if you, sir, could devote a corner of your valuable journal to the registry of such information, under the heading, "Labour Market," you would confer a great boon upon the working population of this country.

It must be clear to every one that emigration becomes a necessity when population begins to exceed the demand for labour; but this, it should be recollected, may be the condition of some of the colonies as well as of the mother country; and to emigrate to colonies in straits similar to those of the old land would be both absurd and useless, unless, indeed, the emigration should be organised as a co-operative community under the presidency of capital, and in all respects, as a community, proportioned and complete in itself; for one commodity all the colonies have to offer, viz., land.

We must disabuse men's minds of the notion that the mere transfer of human beings from one part of the world to another can improve men's circumstances. There is, first of all, the expense of getting to the new country, and should emigrants find on their arrival that there also labour is already in excess, and they be without funds, what is to become of them? Their new state would not be one whit better than their first. It is true that there would be millions of acres of outlying land to be cultivated. But land requires patience and an outlay of capital before it will afford means of subsistence. Who shall furnish the capital? Here, then, we may perceive that there is an opportunity for capitalists to come to the rescue, and to organise co-operative companies of emigrants. The capitalist would purchase lands and assist the emigrants with means during its cultivation on certain conditions, which should, of course, be fairly remunerative for the aid lent. The Colonial Governments might themselves find that it would be to their interests to be the capitalists to such communities of emigrants, and that it would also be a means of rapidly increasing the growth and wealth of their colonies.

Could not "home colonisation" be effected here, to some extent, on the same plan? If it could, the expenses of transit would be saved. This is a suggestion which I put forward some years since in these pages, and also in the Journal of the Society of Arts. Of course, this project is not to be confounded with that for the cultivation of waste lands. It is a project for a commercial enterprise, in which the *petite culture* might have a fair and wider trial.

The constitution of any sub-colony such as that I have described, should be proportioned in its elements, and no hands should be permitted to participate in any organisation of this kind over and above those absolutely required for its efficient working. W. CAVE THOMAS.

CASH PROVISIONS IN CONTRACTS.

SIR,—Having during the last few years prepared in London and provincial towns as many extras and omissions bills as any quantity surveyor, although doing very little at present, I beg to say, in answer to the letter in last week's *Builder*, headed "Prime Cost," that I find the general accepted interpretation of prime or first cost to be the amount of the merchant's invoice, after deducting the "trade discount," but not deducting the 2½ per cent. "cash discount" allowed if cash is paid by the contractor, thus:—

Say, Benham & Son's account for stoves	£50	0	0
Deduct trade discount, say 10 per cent.	5	0	0
Net amount of merchant's invoice, being prime or first cost	£45	0	0
Deduct cash discount, 2½ per cent.	1	2	6
Total amount of cash paid by contractor	£43	17	6

Trade discounts, of course, vary. Take, for instance, the trade discount off iron pipes (gas and water), which has been known to be as much as 50 per cent. off the list or invoice price; but when the market value of the metal (iron) has been at a very high price per ton, the list prices have been the net prices, or prime cost, until the market, like a ship, "rights itself," or, in other words, the market recovers its equilibrium.

In "measuring up" or adjusting extras and omissions bills, to the net amount of the merchant's invoice has to be added the usual "builder's profit" of 15 per cent.; that is to say, if the builder has, in the first instance, added 15 per cent. to the amount of the cash provision. To ascertain this, a blank copy of the lithographed bills of quantities should always be priced and moneyed out, and deposited under seal with the architect previously to signing the agreement specification and drawings, and only opened for the purpose of valuing the extras and omissions.

If the wording in the lithographed bills of quantities, or the specification, is,—"Provide the P. C. amount of ten pounds for [say] encaustic tile pavement, and allow for profit," the adjustment would stand thus:—

Omission:—			
Cash provision, ten pounds	£10	0	0
Add builder's profit, 15 per cent.	1	10	0
Total amount of omission	£11	10	0
Addition or Extra:—			
To net amount of, say, Burke & Co.'s account for pavement, after deducting trade discount, if any, but not deducting the 2½ per cent. cash discount, if cash is paid by the builder	10	15	0
Add builder's profit, 15 per cent.	1	12	3
Total amount of extra	£12	7	3

But if, upon referring to the priced bills of quantities, it is found only 5 per cent. has been added to the cash provision of the builder in the first instance in framing his estimate, then only 5 per cent. builder's profit is recognised, and if no profit at all has been added, then no builder's profit is allowed upon the net amount of the merchant's invoice. Further, if the wording in the lithographed bills of quantities or specification is,—"Provide the P. C. amount of ten pounds for [say] stoves, and allow for profit and fixing," the value of the fixing or setting (sometimes day work, which would include profit) has to be allowed, in addition to the amount of the merchant's invoice for stoves.

Again, where the cash amount provided is not all expended, the merchant's invoice and profit, amounting to only 8*l.*, and the provision being 10*l.*, the difference between the two amounts should be omitted in the omissions bill + the 15 per cent. = 2*l.* 6*s.*, total amount of omission, unless a smaller amount of per-centage has been carried to the cash provision in the first instance.

It is certainly at all times preferable, if practicable, to deal only with the difference between the cash provision and the merchant's invoice, the quantity or measuring surveyor being paid a per-centage upon the total amounts of the extra and omission bills,—the larger the amount of those bills the greater the expense, or cost, to an architect's client.

I would ask what per-centage is the recognised "builder's profit" to be added to the prime cost of the merchant's invoice. I always added on 12½ per cent. as profit to the cash provisions, until a London quantity surveyor representing the architect, and I representing the contractor, altered my 12½ per cent. builder's profit on the merchant's invoice in my bill of extras to 15 per cent. In that instance the wording in the lithographed bills of quantities was, "Provide the P. C. amount of ten pounds *including* profit." The "builder's profit," of course, had then to be allowed out of the cash provision of 10*l.* upon the amount expended, and only the net amount of 10*l.* omitted.

When provisions are for labour and materials, *i.e.*, rods of brickwork, cube yards of concrete, or digging, and the wording in the lithographed bills of quantities is, "Provide two rods of brickwork, to be expended as directed by the architect," the recognised prime cost per rod of the brickwork is then the price it is valued at by the contractor in the lithographed bills of quantities supposed to have been deposited with the architect to form a schedule of prices to value extras and omissions by; but if the architect instructs the quantity surveyor to insert the market value per rod in the lithographed bills of quantities, which would read thus, "Provide two rods of brickwork at fifteen pounds per rod P. C. [assuming that to be the market value per rod], and allow for profit," the prime cost per rod of the brickwork would then be your 15*l.* This also prevents the fraud of the provision for brickwork being valued in the bills of quantities at a lower price per rod than the market value, when it is thought probable the whole of the provision for brickwork would not be required, and consequently there would be an omission.

I have known provisions of brickwork to be as much as 50 rods with cube yards of concrete, "dig and cart," and cube sets of fir in proportion. This is when a large quantity of underpinning is anticipated, or it is assumed party walls have to be rebuilt, and an architect wishes to furnish his client with an inclusive estimate; but even then I would venture to suggest a lump sum. "Cash provision" is preferable, for this work can always be valued on the site, approximately, by a competent surveyor. When the wording in the bills of quantities is "allow" (not "provide"),—for instance, "Allow for cutting away, attending upon, and making good after all trades, and in all trades, including gasfitter and bellhanger,"—this the contractor, or his representative, places his own valuation against, and that, or any other "sporting item" (*i.e.*, may be worth more, or may be worth less), where the word "allow" occurs, cannot be re-opened when the bill of extras and omissions has to be adjusted, but the contractor's valuation is final and binding. WILLIAM H. PIPE.

THE POOR IN ENGLAND.

SIR,—It is not clear how the particulars of the career of the Rev. Richard Hibbs, given by your correspondent Mr. Ward, can interest your readers unless in connexion with some practical scheme for the diminution of poverty; and it is surprising that no hint at the nature of his plans is given in the letter of that gentleman. When a man having novel ideas to make public chooses the crowd of promenaders in Regent's Park as his audience, one cannot help being struck with the inadequacy of that audience for the reception of any great and valuable proposition; while, if the proposition is foolish and impracticable, one can hardly see why those who go there for a Sunday afternoon's stroll should be pestered with it.

However, as Mr. Ward has shown that the training of this clergyman has been different from that which is common, it would be unfair to judge his mode of proceeding by common rules; and one fee s that it is quite possible for him to have seen some things connected with his subject which have escaped the notice of ordinary men. Pray let me ask your correspondent, who evidently knows Mr. Hibbs's views, and seems to agree with them, to give such a short statement of the measures which he advocates as may enable us to judge whether they are worth studying in detail. I need hardly say that, before such an audience as your columns can command, the assumption that a good and practicable scheme will be met with ignorant prejudice, or will be stifled by self-interest, would be out of place. On the contrary, it seems to me that the vast body of men engaged in the arts of construction are more likely than any other class to understand any plain statement bearing on the condition and prospects of the poor, and they are very unlikely to be troubled with any belief in the perfection of our arrangements for the prevention of distress, or for dealing with it where it exists. THOS. BLASHILL.

Bad Water.—Through contamination of the water supply at the Female Orphans' Home, Jersey, an epidemic of gastric fever has broken out, and six children have died out of forty-five who were attacked. This mortality has been increased by an outbreak of measles, which affected fifty-one children, eleven of whom have died.——A whole family has been poisoned at Banstead, Surrey, through drinking impure water from a tank or well. One of the children has already died, and the other members of the family are lying dangerously ill. The Epsom rural sanitary authority ordered the well to be immediately closed.

APPOINTMENT OF SURVEYOR OF HIGHWAYS, DARTFORD DISTRICT.

SIR,—Having had my attention drawn to two letters in your issue of the 13th of September relative to the above appointment, I think it but right that the public should be informed of the true state of affairs; and as your correspondent who signs himself "Fair Play" has taken upon himself to publish that which is not true (in error, I hope) when he states, "*I told him that one of the waywardens told me to apply for the place*," I most distinctly say I did not tell him anything of the kind. What I did say during the time of the election was: On one occasion, when at Bromley, I met one of the waywardens (whom I knew some years ago), who asked me "what I was now doing"; on my answering, "I was about leaving the surveyorship of highways of the Bromley district," he (the waywarden) said, "Are you going in for ours?" My reply was, "Which is 'ours'?" His answer was, "Dartford." I then said, "When it comes out I intend to do so." I did not see that gentleman again until a few minutes before the election; the only remark passed was, "There are so many applications it will be necessary for the Board to meet much earlier."

I most distinctly say I did not canvass personally or by letter any member of the Board.

Both your correspondents "Fair Play" and "A Candidate" seem under the impression I was a *local* man, and it was determined I should be elected in spite of all good and worthy applicants, whether qualified or not.

As regards qualifications, allow me to inform them that my experience in road surveying commenced in the year 1856, since which I have had about thirteen years' experience in that particular business, and I hold good testimonials from all my appointments. I have twelve lying in front of me at this time from our neighbouring gentry, speaking in the highest terms of my abilities. Are these all forgeries? Let your correspondents pause and consider ere again scattering such insinuations both against a Board and a more successful candidate than themselves. Fair criticism I advocate; but they have descended to a much lower level than that.

I may add, when I was selected by the Bromley Board, I sent my application, with six testimonials, to the clerk, saw no member of the Board until I entered their Board-room, neither canvassed by letter nor otherwise, and was elected in preference to three other selected candidates, *all local men*, nor had I been in the county even for twelve or thirteen years.

I trust you will allow me the privilege of vindicating myself, more especially when I tell you I have had the misfortune to lose my arm, now some twenty years ago.

E. B. STEPHENS, the Successful Candidate.

STAINES TOWN-HALL.

SIR,—In reply to your correspondent, "Esprit de Corps," I am in a position to know that over 160 applications have already been made for conditions; I had to wait till fresh copies were printed, the first 100 having been distributed.

The building required is only plain, straightforward work, no carving being needed, and, consequently, no artistic drawings wanted.

I shall be glad if the letter of "Esprit de Corps" has the effect of preventing further competition, as I am afraid there are already too many striving for the honour and glory to be gained by the successful candidate.

ONE WHO INTENDS TO COMPETE.

THE LIVERPOOL MASTER BUILDERS' ASSOCIATION AND WAGES.

SIR,—This Association has given notice to the operatives in the building trade that the following reductions in the wages will be made, to come into operation after March 31, 1880:—Masons from 8½d. per hour to 7½d. per hour; bricklayers, 8½d. to 7½d.; plasterers, 8½d. to 7½d.; joiners and carpenters, 7½d. to 6½d. in the summer,—8½d. to 7½d. in the winter; plumbers, 8½d. to 7½d.; and the wages of the operative painters (after February 29th, 1880) will be 6½d. per hour instead of 7½d. as at present.

W. KNOX, Secretary.

CIRCULAR-SAW GUARD.

AN ingenious arrangement to prevent accidents with circular saws, which require incessant watchfulness on the part of the operatives, has been invented by Mr. J. B. Lakeman, her Majesty's Inspector of Factories, central metropolitan division, who has presented it freely to the public in their interest, and has in no way protected it by patent right. From a lengthened experience of the many severe and fatal accidents arising from circular saws, Mr. Lakeman frequently suggested a fence, but was too often told that his ideas were Utopian. But upon representing the case to Messrs. Richard Garrett & Sons, of the Leiston Works, Suffolk, they generously set to work to perfect Mr. Lakeman's ideas, and have produced an effectual guard against accidents from circular saws.

The guard consists of three pieces, namely:—The mortise-plate secured by three bolts to the fence; a radial arm, which is secured and adjusted vertically into the mortise-plate by means of nut and collar; and the covering-plate, which is secured and adjusted laterally in the radial arm, in conformity with the adjustment of the saw-fence, by means of the thumb-screw. Where several saws of various diameters are used in the same bench, it is advisable to have two or, perhaps, three covering-plates, graduating in size to cover the whole series of saws. The apparatus, as described, is in its mode of fixing exceedingly simple. It is to be recommended on account of its simplicity, its cheapness, its immovability when fixed, and for its perfect freedom from being obstructive to the sawyer,

HOSPITALS.

London.—University College Hospital was re-opened on the 22nd ult., having been closed for a period of seven weeks for alterations and enlargement. For some time previously the managing committee had felt the need of more accommodation, and by pulling down partition walls, giving portions of the wide landings in the north wing to the wards, and moving the sleeping apartments of the majority of the nurses and assistants to some adjoining houses, room for forty additional patients has been obtained, and the number of beds available for urgent cases increased from 160 to 200. Advantage has been taken of the opportunity afforded by the removal of all the patients to make some important improvements in the sanitary arrangements of the hospital. Old brick drains have been replaced by stoneware pipes, and means have been taken to prevent the admission of sewer-gas into the building. The sinks, &c., formerly within the wards, are now placed in closets built outside, and the walls and woodwork throughout the interior of the hospital have received a coat of Griffiths's silicate paint. Attention has also been given to the improvement of the ventilation. In the basement, where the various kinds of baths for the treatment of skin diseases obtained through the exertions of the late Dr. Tilbury Fox are placed, there have been no material changes. The operating-room has been enlarged by a method of constructing the folding-doors, devised by Mr. N. H. Nixon, the secretary. By sliding the doors out into the corridor and inserting an extra movable door, a considerable addition is made to the space in the pit for the operators, while half the width of the corridor remains as a passage. Another alteration for the benefit of the patients has been effected by making an apartment under one end of the operating-room gallery, in which chloroform may be administered to the patient. The sufferer will thus be spared the trying ordeal of seeing the students before the operation begins, and will be already insensible when wheeled into the theatre on the operating-table. Many changes have been made on the top floor. Here the children's ward is now placed, and what was possible has been done for their comfort; but to make this room pleasant and cheerful for the little inmates some pictures and other things are still needed. On this floor a room has been fitted with iron racks, in which the patients' clothes, after fumigation, can be stored until the owners leave, light suits being supplied for the men to wear during the time they are in the hospital. In the north wing are wards carefully isolated, in which any cases of erysipelas or other contagious diseases may be treated. These alterations have been carried out by Mr. W. A. Scurrah from the plans of the two architects, Mr. A. Blomfield and Mr. Shepard, and the cost, including the new beds, furniture, &c., will probably be about 3,500*l.*

Wolverhampton.—At the Wolverhampton and Staffordshire General Hospital, the governors have just provided new laundry buildings, which are situated just below the dispensary department at the rear of the hospital. The premises consist of three rooms on the ground floor, the interiors of which have been fitted up by Messrs. Bradford & Co., Manchester, with their steam washing and drying apparatus. The dirty linen from the hospital is first taken into the wash-house, where it is placed in closed washing-boxes filled with soap and water, and which are kept constantly rotating at a very rapid rate by means of steam power. After undergoing this process for about fifteen minutes they are taken out and each article put through the rollers at the top of the boxes so as to squeeze out the dirty water. They are next placed in a combination rinsing-machine, consisting of two compartments or open boxes. In the first box the clothes are thoroughly rinsed in fresh water, and then, after being again passed through the rollers, are placed in the second box, which is filled with blue water. From here they are taken, after the water has been wrung out of them, and placed in a kind of open iron cylinder, with a thick cone-shaped shaft in the centre, termed a hydro-extractor. The wet linen is packed tightly round the central shaft and then the cylinder is set in motion at the rate of about 700 revolutions per minute. This creates a strong, fan-like current of air, and has the effect of compressing the wet linen to such a degree as to force out nearly every particle of moisture it contains. After this the articles are taken to the drying-room. Here they are opened out and hung upon a series of large clothes-horses, which are then run on slides into a closed-up chamber, with an open wire-work bottom, situated over the boiler in the basement of the building. The heat from the boiler is supplemented by a number of hot-air pipes, and in this way the drying process is very quickly and efficiently completed. From the drying-room the clothes are taken to the laundry, where a patent mangle, also worked by steam, is in constant motion, and here the various articles are mangled and folded ready for use. The total expense of fitting up the machinery and erecting the new buildings has amounted to about 1,000*l.*

CHURCH-BUILDING NEWS.

Sawley.—Sawley Church, Yorkshire, has been rebuilt upon its old site and consecrated by the Bishop of Ripon. With some extensions, the church, which is dedicated to St. Michael and All Angels, consists of chancel, nave, vestry on the north side, and porch on the south. The new church is Early Decorated in style, and is built of local stone, and covered with green slates. The nave fittings are in pine, the pulpit and chancel fittings are of oak. The reredos and stonework of the pulpit are of Studley limestone. The old font is fixed on new steps. The stained glass in the east window is the gift of Mr. Wormald, the subject being "The Good Shepherd." The total cost of the church has been a little over 2,000*l.* Mr. Birchall, of Leeds, has been the architect, and Mr. Grainge, of Otley, the contractor.

Brinkworth.—The chancel of Brinkworth Church has been re-opened, after restoration in accordance with the designs and plans and under the supervision of Messrs. Middleton & Son, architects, Cheltenham; the contractor being Mr. William Jones, of Gloucester. Previously the chancel was in a most dilapidated state, the side walls being as much as 14 in. out of the perpendicular, the roof entirely decayed, and the flooring gone. The walls have been rebuilt, but care has been taken to use the old material, the windows being carefully preserved, the stones numbered as they were taken down, and replaced in precisely their old position. The stones of the doorway were treated with similar care. The roof is of panelled oak, intended shortly to be decorated with carving, and the floor is of encaustic tiles from Messrs. Minton's. The east window, which is a good specimen of Perpendicular work, has been filled with stained glass by Mr. de Quetteville and his brothers and sister as a memorial of their parents. Messrs. Hardman, of Birmingham, executed the window. On the removal of some of the white-wash, remains of colour were traced, and on one of the piers to the nave a complete painted figure was discovered.

Tarfside.—The foundation-stone of a new Episcopal Church at Tarfside, Glenesk, has been laid by Lord Forbes, at whose sole expense the structure is to be built, as a memorial of his relative, the late Bishop Forbes. Like the buildings that preceded it, it is dedicated to St. Drostane, who about the ninth century laboured in Glenesk. At the request of his lordship Messrs. Matthews & Mackenzie, architects, Aberdeen, prepared the necessary plans. The general style is Early Gothic, of a simple character, in keeping with the material to be used. The church consists of a nave, 46 ft. by 21 ft.; a chancel, 21 ft. by 15 ft.; with semi-circular apse at the east end 19 ft. in diameter. It is to be built of the finest granite that can be obtained in the neighbourhood, the dressed stones being prepared in and brought from Aberdeen, coming by rail to Laurencekirk, whence they are carted to Tarfside. On the north side of the chancel will be a vestry, and entry to the church is obtained by a porch at the south-west corner. The roof will be an open one, with rafters of pitch-pine, stained and varnished. The apse will be lighted by three stained-glass windows. The figure will be that of our Saviour as the Good Shepherd; on the right will be St. Andrew, and on the left St. Peter. The contractors for the building are:—Mason, Mr. Alex. Crabb, Brechin; joiner, Mr. A. Dures, jun., Brechin; plumbers, Messrs. C. Wood & Co., Montrose; slaters, Messrs. J. Wishart & Sons, Caldhame; plasterer, Mr. A. Crabb, Brechin; painter and glazier, Mr. G. Donald, Aberdeen. Mr. S. Porter, Tarfside, is superintendent of works.

Bampton.—The interior of Bampton parish church has recently been undergoing some

important alterations and repairs. The columns for successive generations have been greatly disfigured by the addition of plaster, variously coloured, and latterly with yellow and black paint. All this has been cleared off, and the columns, composed of the well-known Beer stone, stand in their own natural beauty. The ornamental capitals are also seen to advantage. Mr. J. C. Nagle, the tithe impropriator, defrayed the expenses of the works in the chancel. The work has been done by Messrs. Pearse & Davy.

DISSENTING CHURCH-BUILDING NEWS

Tain.—The United Presbyterian Church, Tain N.B., has been re-opened, after having been entirely remodelled internally from designs by Mr. Mackintosh, architect, Inverness.

Hatherleigh.—A new Baptist Chapel has been opened at Hatherleigh, Devon. It has been erected from the designs of Mr. J. B Horne, and is Gothic in style, the materials used being the hard native Cleave stone, with lighter facings from the same quarries. The total length of the building is 60 ft., breadth 28 ft., and height from base to gable 40 ft., and it will accommodate about 500 persons. Messrs. Petherick Brothers, Hatherleigh, have been the builders, and Mr. T. Knowles has attended to the glazing and plumbing.

Hanley.—The foundation-stone of a new Congregational church at Milton, near Hanley, was laid on the 1st ult. Mr. A. R. Wood, of Tunstall, is the architect, Mr. Bennett, of Burslem, being the builder. Accommodation will be provided for 225 persons. The cost is estimated at upwards of 800*l*. The general design is Italian in character, carried out with red pressed bricks, and terra-cotta and stone dressings. Hill & Hey's syphon ventilators are to be used.

Galashiels.—The memorial stone of a new United Presbyterian Church was laid at Galashiels on the 16th ult. The church is to be built from designs by Messrs. Thornton Shiells & Thomson, Edinburgh, in the Early English style, with area and gallery on three sides, or rather with galleries on all sides, as the choir gallery, with accommodation for sixty singers, is set behind the pulpit. It is to accommodate 760 persons in all, with session-house, vestry, ladies' room, and large hall for Sabbath-school and other meetings. A prominent feature will be a spire 120 ft. high. The builders are Messrs. Murray & Co., Galashiels.

Shrewsbury.—A new Wesleyan chapel, at St. John's Hill, Shrewsbury, was opened on August 30. The building has been erected from plans supplied by Mr. G. B. Ford, architect, Burslem, the builders being Messrs. W. & J. Gethin, New-street, Frankwell, Shrewsbury. The chapel will accommodate 630 persons.

Stoke Bruerne.—The foundation stone of a new Wesleyan Chapel has been laid in this village. The building is being erected from plans prepared by Mr. George Shakeshaft, of Ashton, by Mr. Charles Tew, of Stoke Bruerne. The site is at the northern part of the village, and almost contiguous to the old chapel. The building will be of red and white bricks, and is to accommodate about 180 worshippers, being just double the number which the present chapel will seat. The cost will be about 300*l*.

Liverpool.—The memorial stones of a new Wesleyan Chapel in Walton-road, Kirkdale, have been laid. The new edifice, which is intended for the congregation at present worshipping in Salop-street Chapel, will be built in the Italian style, the walls being faced with the best Ruabon bricks, with dressings of local stone. The chapel is arranged on a transeptal plan, the body being 70 ft. by 50 ft. inside, and the width across the transepts 64 ft. 6 in. The building will accommodate 1,100 worshippers, and the cost of the whole, including boundary walls and architects' commission, will be about 4,600*l*. The designs have been prepared by Messrs. William Waddington & Son, of Burnley, under whose superintendence the work will be carried out. The contractor is Mr. Samuel Webster, of Bootle.

Boscombe.—The erection of a new school-chapel for the Wesleyans of Boscombe has just been commenced. It is being erected at the back of the site for the proposed permanent chapel which is to be hereafter erected. The present building will be in the Early English style, and will be 33 ft. by 21 ft. internally. Mr. Curwen, of Liverpool, is the architect, and Mr. Collins, of Winton, is the builder.

Longton.—Zion Chapel, Longton, has been re-opened, after alterations and re-decoration. The general decoration of the chapel has been done by Mr. G. H. Plant, of Longton, and the whole of the works executed from the plans, specifications, and details prepared by Mr. W. Wood, architect, Longton.

Chartham.—The memorial-stones of a new Wesleyan chapel at Chartham, Kent, have been laid. The chapel is intended to seat 240 persons, but this can be increased by throwing into it a schoolroom which will provide for about 100 more. The architect is Mr. Ranger, and the total cost will be 600*l*. The style is Gothic.

SCHOOL-BUILDING NEWS.

Hindley Green.—On the 23rd ult. the foundation stone of new National schools at Hindley Green, near Wigan, was laid by Mr. Thos. Kirkpatrick, J.P. Accommodation will be provided for 150 children. The site of the building has been given by Mr. Kirkpatrick. The cost of the building is estimated at about 1,100*l*.

Kettering.—The memorial stones of a new Wesleyan school, to be erected in Rockingham-road, Kettering, have been laid. The building, which is also to be utilised as a mission chapel, will contain one large room, 60 ft. by 30 ft., and a class-room, 14 ft. by 12 ft., together with the necessary outbuildings. The style will be Gothic, of a simple character. The architect is Mr. R. Johnson, of Melton Mowbray, and the contractors Messrs. S. Mawby (carpentry), and Mr. J. Coltman (brickwork). The total cost will be 590*l*. The contract for the minister's house, which will be begun immediately upon the completion of the school, is 615*l*. A site has been reserved for a new chapel.

Wolverhampton.—On the 13th ult. the foundation stone of a new school-church, which is being erected at Springfields, Wolverhampton, was laid by Mr. Robert P. Walker. The structure is intended to serve as a school-church, and will be 80 ft. long by 27 ft. wide, the side walls 17 ft. high, and the total height to ceiling 25 ft. The work is being carried out by Messrs. G. & F. Higham, from the designs and under the superintendence of Mr. T. H. Fleeming, architect. The estimated cost is about 1,100*l*. The walls will be faced externally with red pressed bricks.

Winchester.—The buildings of "Winchester Modern School," which is intended for the sons of people belonging to the middle classes, are now near completion. They occupy a prominent site on the west of the Romsey-road, on a spot overlooking the Berkshire hills and the Itchen Valley, the Isle of Wight, &c. The land taken is some twelve acres in extent. The style is a combination of modern and semi-Tudor architecture. Mr. T. Stopher is the architect, and the contract has been carried out by Messrs. Carter, of Winchester. The cost of the land, with the buildings at present constructed, is about 10,000*l*.

Henley-on-Thames.—The National schools at Henley-on-Thames were re-opened on the 13th ult. after enlargement. The new buildings consist of an entrance-lobby; school-room, 54 ft. by 24 ft.; class-room, 21 ft. 5 in. by 15 ft.; with lavatory and offices, and they will accommodate 202 scholars. The entire cost will be about 600*l*. The new work is of brick and flint, with a tiled roof, and has been erected by Mr. Weyman, builder, Henley, under the superintendence of Mr. W. Wing, architect, Henley.

VARIORUM.

"The Model Locomotive Engineer, Fireman, and Engine Boy," by Michael Reynolds (Crosby Lockwood & Co.), gives a little history of the pioneer locomotive engines and their inventors, and a project for the establishment of certificates of qualification in the running service of railways. It agreeably combines amusement with instruction, and is well calculated to fire the ambition and increase the efficiency of those to whom it is more particularly addressed. Mr. Reynolds's fitness for the task is well known. ——"The Four Old Lodges, Founders of Modern Freemasonry and their Descendants," by R. Freke Gould, recently published at Spencer's Masonic Depôt, is a record of the progress of the craft in England down to the union in 1813.——"Notes on the Scenery and Geology of Ireland," by T. Mellard Reade, F.R.I.B.A., is a reprint from the Proceedings of the Liverpool Geological Society (Liverpool: Tinling & Co.).——The "Transactions of the Manchester Statistical Society," 1878-79, contains some papers on important subjects well treated,—for example, the Depression of Trade, by Mr. Elijah Helm; the Relations of Capital and Labour, by Mr. Geo. H. Pownall; and Economical Aspects of the Land Question, by Mr. W. Summers, M.A.——The October number of the *Nineteenth Century* includes the first of a series of "Familiar Letters on Modern England," by Karl Hillebrand. The writer is acute and cultured, and evidently seeks to be impartial.——"House and Home" improves in its literary matter, but we cannot say so much for its portraits. The fear of being so presented to a curious public would deter many from efforts to be eminent.——From *The Great Industries of Great Britain* for October, we get some memoranda as to American locks:—"When good work abounds spurious imitations of it are sure to be plentiful; but the old effort to discredit all the numberless productions of Birmingham, by calling them 'Brummagem goods,' was not more unjust and foolish than is the more recent habit of condemning as trumpery all the ingenious novelties introduced by American manufacturers. Instead of sneering at them, English manufacturers, if they are wise, will follow the example of the Americans. By their inventive wit and their mechanical tact they are superseding us, for instance, in the lock trade. They will turn out a serviceable lock and key which they can afford to sell for two or three cents, or we can buy from them another which is cheap at a thousand dollars. A curious specimen of the latter sort is the chronometric lock, the history of which may be given in Mr. Bain's words:—'The thief-proof safes of the United States,' he says, 'are, I believe, admittedly superior in quality to those manufactured in Europe; and, when burglars effected an entrance into a bank, they found they could not drill the safe in the time at their disposal; so they adopted a different mode of robbery. The gang seized and gagged the whole household. They then presented a pistol at the head of the manager and demanded the keys of the safe; and, as generally man will do anything to save his life, they got the keys, plundered the safe, locked it again, and made off, leaving the family gagged. Many burglaries of this kind have occurred in the United States. To prevent such a case happening, the chronometric lock has been invented. It is a mixture of a lock and a timepiece, and may also be a combination lock. Suppose the hour of closing the bank is five o'clock in the afternoon, and ten o'clock next morning that for opening it: the manager, when he goes to close the safe, sets the clock-work of the lock to ten o'clock next morning, and then locks the door of the safe. That done, it is impossible for any one to unlock the door until next day. The key is of no use till the usual hour for opening the bank, when the chronometric arrangement in the lock drops a bolt, and permits the key to turn and the door to be opened.' That particular lock is, perhaps, more ingenious than generally useful; but it illustrates the smartness with which the Americans contrive to meet every want, and threaten to render obsolete the older arrangements with which our own manufacturers think we ought to be satisfied because they were good enough for our forefathers."——The new number of the *Magazine of Art* speaks of Mrs. Butler, *née* Thompson:—"Miss Thompson was born at Lausanne, on the border of the Lake of Geneva. Her mother, during the winter of her daughter's birth, cultivated her favourite art of landscape-painting, and the natural pictures of the snowy mountains and the ice-bound lake, set as they often were in magnificent sunsets, were the first objects that caught the child's eyes. Charles Dickens, the close friend of Elizabeth Thompson's father, was the companion of this Swiss sojourn. All her early years were divided between Italy and England, the almost uninterrupted sunshine of the Eastern Riviera of Genoa brightening her winter quarters, while the heart of the English country was usually her summer residence. Country life, with the companionship of a sister, and with perfect freedom to run about on the hills of Nervi, or in the fields of Kent, to watch the horses at their farm-house work, and even, it is whispered, to play cricket on the village-green, formed a healthy contrast to the studies which were vigorously pursued from the age of five to that of seventeen, under the sole tutorship of Mr. Thompson, who (himself educated at Cambridge, and possessed of an independent fortune) entirely devoted himself to the training of his

two daughters. That they should be good swimmers, good billiard-players, and good marks-women with a pistol, entered into the scheme of 'accomplishments' which he resolved to give them. The familiarity with animal life was peculiarly favourable to the Rosa-Bonheur aspirations of the little girl, while the free, demonstrative, and expressive character of the Italian peasantry stimulated her singularly keen power of observation. Her father was early struck by this power, and developed it watchfully and constantly, drawing the child's attention especially to outward manifestations of character. There is much that is dramatic in Italian life, and nowhere could the faculty peculiarly belonging to the artistic, as apart from that which pertains to the more meditative literary talent, the faculty of objective observation, find greater scope than there. The dramatic power which was afterwards shown in the faces of the men in 'The Roll-Call' and 'Quatre Bras' germinated in those early days."—Cassell's *Family Magazine* says, as to the population of New York,—"After a three years' rule of the colony which he had subdued, Colonel Nicolls was superseded in 1667 by Francis Lovelace. In October, 1673, the Dutch recaptured the town, and held it till the ensuing February, when it was restored by treaty to Great Britain, whose possession of it remained thenceforth undisturbed, till 1783 made it independent in common with the whole of the United States. Its subsequent history is too well known to need repetition; but the statistics of its growth are worthy of a passing glance before concluding. In 1656 the population was 1,000; in 1664, 1,500; in 1673, 2,500; in 1690, 4,302; in 1731, 8,629; in 1771, 21,163; in 1773, 21,876; in 1786, 23,614; in 1790, 33,131; in 1800, 60,489. But while the lapse of nearly two centuries barely carried the total above 60,000, the seventy-eight years which have since passed, have raised it to the astounding figure of 1,170,142, a rapidity of increase to which Europe can furnish no parallel."

Miscellanea.

The Artisans' Institute and Technical School.—The trustees of this Institute, 29, Castle-street, Upper St. Martin's-lane, have published a report for the year 1878-9, and ask support for another year. The report says:—"In order to render the classes more useful, an announcement was made early in the session that apprentices would be admitted free on producing letters of recommendation from their employers. Although all those who have attended these classes during the last five years have strongly expressed their sense of the benefit they have derived,—many obtaining advantages in wages and position which would otherwise have been out of their reach,—this could not be generally known to the public. The tangible value of such instruction is not yet so obvious as to make apprentices or their parents willing to pay fees for such instruction. This is not expected even in Switzerland or Germany, where primary and technical instruction has been widely known and appreciated for many years. Such schools are not found on the Continent to be self-supporting, and are liberally supported by municipal bodies and the State. It is not, then, reasonable to expect that the Artisans' Institute should be self-supporting, or that our apprentices and workmen should pay more than very moderate fees, if any." The trustees re-opened the classes on Wednesday last, and they intend to increase their number in accordance with requests made to them by intending students.

Fall of a Scaffold.—On the 25th ult., a serious accident happened in Newton-villas, Kilburn. A pole snapped asunder, and the whole of the scaffolding that was supported by it fell outwards, carrying a staging about 20 ft. from the ground with it. Four men who were standing on the staging were precipitated below with great violence; two of them,—Charles Wharton, 40, and Henry Wildman, 23,—sustained fractures of the arm and thigh, and several lacerated scalp wounds, necessitating their removal to the hospital.

A New Congregational School, serving temporarily as a school-chapel, is to be erected forthwith at Carnforth. The site is a good one, and a larger chapel is intended to be built hereafter, adjoining the school. Messrs. Hetherington & Oliver, of Carlisle, are the architects.

Quebec Dock Labourers.—We have previously had occasion to remark on the exorbitant rates of wages demanded and obtained by the Quebec Dock labourers, through the tyranny exercised by their trade-union, miscalled the "Labourers' Benevolent Association." From recent advices from Quebec, it appears that this association, not content with hampering the trade of the port by their excessive charges, are resolved to prevent other labourers, not being members of their society, from working at lower rates. A new society of French labourers, entitled "L'Union Canadienne," mustering some 3,000 members, has recently been formed, with the object of taking work at lower rates than the old association, viz., $1·50 to $2·50 per day, instead of the $4 which have hitherto been exacted by the "Benevolent Association." About the middle of last month the new society, making a parade of its forces, came into contact with the rival body, and a riot of a most disgraceful character was the result, in which more than one life was sacrificed, and a number of persons seriously injured. A sort of anarchy appears to have reigned in a portion of the town during the fight, as shops were freely sacked, and peaceable citizens assaulted, while the police and civic authorities seem to have contented themselves with looking on and holding councils. There is doubtless blame to be attached to both sides, and the settlement of a trade dispute in such a primeval manner is by no means creditable to Quebec, but for the sake of the trade of the port, in which the timber trade here are deeply interested, we sincerely hope that steps will be taken to suppress the tyranny of the Labourers' Benevolent Association, and permit a fair field and no favour to men who are willing and able to do the work at a fair and reasonable wage.—*Timber Trade Journal.*

Commercial Education: Guildhall Library.—The Guildhall Library is known as a liberal institution, with a good general library for literary students, and a free public library. Attached to the latter is, however, a department likewise under the care of Mr. W. H. Overall, the librarian, which is well calculated to do practical good. Some call it the Commercial Reference Library, and it has a convenient catalogue. It contains, for instance, what is much wanted,—a good supply of English, American, colonial, and foreign directories, and the Corporation have taken great trouble to get some of these. There is also a good set of bank directories, very useful for reference as to the standing of firms. A set of reference-books on commerce, the arts, agriculture, trade products, accompanies the collection, with many works on banking, currency, exchanges. With what there is in the special library, and the further stores in the general library, the inquirer will find everything that is necessary to give the theoretical part of a commercial education freely at his disposal.

Scaffold Accident.—On Monday, Dr. Hardwicke held an inquiry at the Coroner's Court, St. Pancras, into the cause of death of Hicks Durant, aged 31, carpenter, which took place under distressing circumstance at the Literary Institute, Swain's-lane, Highgate, on Thursday, the 25th ult. From the evidence given by Richard Filbee it appeared that the deceased was in the employ of Messrs. Southcott, builders, and was engaged with others in the reparation of the above institution. At abont five o'clock on the day mentioned, deceased was in the act of handing up some planks, while standing on the scaffolding, to a fellow-workman, but being a little "larkish" he made a slip, and was precipitated headlong into the roadway,—a distance of about 30 ft. He was taken to the police-station, but expired on his arrival there. The jury returned a verdict of "Accidental death," adding that the builders were not to blame in the matter.

A Prussian Railway Bridge.—A very long railway bridge in Germany is now on the point of completion. It crosses the river Vistula near Grandenz, and rests upon twelve piers. The length from the commencement of the first to the end of the last pier is 1,443 mètres, or nearly a mile.

The Jewish Synagogue at Szolyva, Hungary, is the upper story of a bathing establishment. At the New Year celebration the floor of the portion reserved for women gave way, and a frightful scene ensued. Twenty women and children were killed, and as many injured.

Cornish Antiquities.—Mr. W. Borlase, in a communication to the *Athenæum*, says,—"During the past fortnight I have explored another cairn, which has proved to be one of unusual interest. It is situated in the tenement of Tregaseal, near the village of St. Just, and measures about 40 ft. in diameter. In common with nearly all the Cornish tumuli, it is surrounded by a ring of stones which form the basement of the barrow. To all appearance it had been fully explored before, a broad trench having been driven by stone-carriers into the centre. A little to the south-west of this point, however, we found a flat rock, on which had been constructed a rough cist. In this, mouth downwards, and wedged in by small stones, stood an urn, the bottom of which had been crushed into the vessel by the weight of the roofing stone, which had slipped out of its place. The total height of this urn, which has been completely restored, is 21 in., with a diameter of 16 in. at the mouth, and 18 in. at the bulge (7 in. below the rim), from which point spring two handles, each 5 in. in breadth. The whole of the upper portion is ornamented with double indented lines arranged in bands, or acute angles, or in a diamond form. The bottom is only 6 in. in diameter, and upon the inside of it there stands out in relief (from a quarter to half an inch high) the distinct figure of a cross, chamfered or bevelled at the edges, with arms of equal length, which do not reach to the sides of the vessel. It has evidently been made with considerable care and trouble, and is no mere conventional ornament for the purpose of quartering the circle. Mr. Greenwell gives two or three instances of similar crosses having been found in Wilts and Dorset, but to account for them has hitherto defied the ingenuity of archæologists. Immediately behind the cist in which the urn stood, on the south-west side, was the end wall of a very fine sepulchral chamber, one of the stones projecting from which formed also a portion of the roof of the cist. The chamber communicated with the outside of the mound, and the sides and roof were composed of fine granite slabs. It measured 11 ft. 6 in. in length, and the height was 3 ft. 6 in. The floor, as at Ballowal, was strewn with ashes, and the burned bones of a full-grown human subject, amongst which was a quantity of broken pottery and a long sandstone perforated at one end, and used, perhaps, as a whetstone. At the north-east end of the chamber was a raised platform, formed of two flat stones, both under and upon which burnt bones were found.

National Habits of Providence.—The important subject of a National Provident Club, for sickness and old age, to be administered by the Government through its Post-offices, or otherwise, has lately been brought before the public on several occasions, as by Mr. James S. Randall (a member of the executive committee of the Howard Association), and by the Rev. W. L. Blackley (rector of North Waltham, Hants). The latter is the author of a valuable paper on the subject recently inserted in the *Nineteenth Century*.

It is there shown that a large proportion of the poor-rates and of pauperism could easily be avoided by a legal obligation that every youth shall, from eighteen to twenty-one, or thereabouts, pay to the Government (say through the Post-office Savings Bank Department) the sum of about 15*l.* once for all, or 2*s.* per week for three years, and then be *poor-rate free, for life*. This being done, would also, on the average, fully suffice to allow a *repayment*, in the form of 8*s.* per week during sickness, at any period, and a pension of 4*s.* per week during the remainder of life after attaining the age of seventy. Yet here, some objectors to "paternal" legislation have raised the bray of ignorance and selfishness.

For *at present* the law actually compels the provident and industrious to pay a great deal *more* than 15*l.* each, in a lifetime, for the lazy and the vicious.

Accident at the Bow-street Courts.—On Tuesday, Dr. Hardwicke held an inquest at the Middlesex Hospital relative to the death of John Terkington, aged 18, of 65, Edith-grove, Chelsea, who died from injuries received at the building of the new Bow-street Police Court. The deceased, a bricklayer, was in the employ of Messrs. Smith & Son, builders, of Pimlico, and it was his duty on the 19th inst. to land a barrow which was full of bricks on a stage 30 ft. from the ground. On going to land one of the barrows, which had gone a little too high, he missed his footing, and fell down on to a barrow that was standing on the ground. He was picked up much injured and taken to the hospital, where he died on Friday last from the effects of a fractured spine. The jury returned a verdict of Accidental death.

Surveys in America.—An undertaking of great national importance has been organised in the United States, in the shape of a national bureau of surveys, which will commence its operations almost immediately, under the leadership of Mr. Clarence King and a staff of twenty scientific assistants. The objects of the undertaking are to explore and systematically diagnose the sources of national wealth in those extensive western regions which have as yet been surveyed only in a haphazard way; and with this view work will begin by thoroughly examining the great central mineral belt that runs through Colorado, Utah, Nevada, and California. Purely scientific questions will at first give place to economic inquiries, which are considered more pressing. The programme includes a thorough investigation of all coal and iron deposits, with the extent and direction of the veins of precious metals. The information thusgained will prove very valuable, not only to Americans, but also to British and other investors, who will be able to verify from official sources any prospectus of mining properties before they risk their money in a speculative or adventurers' concern. In addition to these objects, it is proposed to survey and classify the public lands, and in connexion with this branch of the commission a great amount of interesting ethnological and ethnographical matter will be forthcoming. The survey of the surface and underground properties in an exhaustive manner has long been a desideratum in the States; for, though a land title is settled by a patent, in the case of mineral land it merely gives the holder of a patent a fighting right to the land, and thus opens the door to endless disputes.—*Engineer.*

Ancient Monuments in Churches.—Mr. Howard Simcox complains of the desecration of ancient monuments in churches which have been altered or restored, as so many are in these days. The church he has in view in writing is in Somersetshire, at Butleigh, a few miles from the ancient town and well-known Abbey of Glastonbury. In that church, in 1624, was erected a fine mural marble monument, with figures kneeling on cushions, crest, and family coat of arms, and a long inscription of the deceased,—a Mr. Thomas Simcox, an ancestor of his, who at that time owned the manor of Butleigh, and is fully described in Collinson's "Somersetshire History" of 1791. On going to see the said monument the other day, after much trouble and search he found the broken fragments under a wooden granary in the squire's premises, where, on going to it, accompanied by the squire (Mr. Ralph Neville Grenville, late M.P. for Somerset), his brother, the vicar, and servants, the latter brought out the said fragments.

Builders' Clerks' Benevolent Institution. The election of a pensioner on the funds of the above Institution took place at the offices, 27, Farringdon-street, on the 30th of September, Mr. Thomas F. Rider, president, in the chair, supported by Messrs. T. Stirling, W. Hewitt, E. Graystone, E. Brooks, J. Robson, &c. There were two candidates, viz., Mr. J. S. Fairley and Mrs. S. A. Coulson, the poll resulting in favour of the former, who was declared duly elected. Votes of thanks were passed in favour of the scrutineers, Messrs. T. Stirling and B. C. Cox, who briefly responded, and to Mr. Rider, acknowledging the important services he had rendered to the Institution.

School of Hygiene.—The Council of the Sanitary Institute of Great Britain have decided to establish a School of Hygiene in London, to be opened during the month of November next. The following gentlemen have been appointed the first lecturers:—*Preventive Medicine*, Dr. B. W. Richardson, F.R.S. *Practical Sanitary Science*, (*a*) Medical and Chemical, Professor Corfield; (*b*) Engineering and Construction, Captain Douglas Galton, F.R.S. *Jurisprudence and Sanitary Law*, Mr. W. H. Michael, Q.C. It is proposed that each session shall occupy about twelve lectures. The school will be open to all classes, and to persons of either sex.

Lifts.—Messrs. Bunnett & Co. (Limited), have been instructed by the Great Western Railway Company to fix their patent lift at the New Station Buildings, Penzance. That firm are also engaged in fixing their lift at the University College Hospital.

A New Town Hall has just been opened at Saffron Walden. It is the free gift to the inhabitants of Mr. Alderman G. S. Gibson, banker, whose family have long been connected with the town.

An "Iron" Church destroyed by Fire.—Shortly before twelve o'clock on the 25th ult., the fire brigade received information of the outbreak of a fire at St. Patrick's Church, Providence-place, Earl's-court-road, Kensington, of which the Rev. M. Ben-Oliel is the rector. In a short time three steam fire-engines and a manual arrived on the spot, and every effort was made to subdue the flames, which by this time had secured a hold upon the contents of the building. The church, which was constructed of corrugated iron, was completely burned out. A house adjoining, occupied by the Rev. W. Tulford, sustained considerable injured. These so-called iron churches, the erection of which is permitted by the Board of Works temporarily, are for the most part delusions and snares. The real framework is actually of wood, of slight scantlings, and the iron anglepieces and horizontal rails are secured to the wood. The skeleton ought properly to be of iron wholly, with such wood as is absolutely necessary secured to it.

Examinations in Technical Education The City and Guilds of London Institute for the Advancement of Technical Education has just issued particulars of the examinations to be held under its direction, the first of which will take place in May next. Provision has already been made for examinations to be conducted in twenty-six subjects. No steps, however, will apparently be taken to provide immediately a staff of teachers, so that intending competitors will for the present stand in need of such help as may be available. There is notably one work which is calculated to be of service both in view of this movement and of the larger range of effort to which it points, viz., the *Technical Educator*, published in four volumes by Messrs. Cassell, Petter, Galpin, & Co. A re-issue in monthly parts of this work is opportunley commenced this month.

Bangor Cathedral.—The work of restoring the nave and chapter-room is being actively proceeded with, and the building in its entirety is expected to be opened early in the year. A curious recumbent figure, believed to mark the grave of an ancestor of the Penrhyn family, has been discovered under the chapter-room, and some old tiles were also found there.

TENDERS

For fire-hose and fittings at the Holborn Union Infirmary, Highgate:—

May Bros.	£245 14 0
Scott & Son	215 0 0
Suffield	196 0 0
Young & Co.	131 0 0
Berry & Son	130 0 0
Beck & Co.	115 4 6
Pontifex & Wood	115 0 0
Shand & Mason (accepted)	92 9 0

For road and sewer making at Woodford, Essex, for Mr. G. R. Holland:—

Richardson	£700 0 0
Dunmore	650 0 0
Pizzey	582 10 0
Wilson	531 9 0
Jackson (accepted)	530 0 0

For alterations and additions to the Wesleyan day-school, Southborough. Mr. S. W. Houghton, architect:—

Punnett & Sons	£265 10 0
Willicombe & Oakley	188 0 0
Gallard & Son (accepted)	181 10 0

For the cabinet fittings at the Ship, Vauxhall Bridge-road. Mr. H. I. Newton, architect:—

Godden (accepted)	£145 0 0

For the erection of Wesleyan school, Waller-street, Luton. Messrs. J. R. Brown & Humphreys, architects. Quantities by the architects:—

Goss	£792 11 11
Gillham	787 10 0
Taylor & Grist	738 0 0
J. & T. Davis	697 0 0
W. Dunham	681 4 0
Smart Bros.	638 6 0
Lissaman	623 15 0
D. Dunham	615 0 0
Rayment & Son (accepted)	569 0 0

For the erection of new boundary walls to the Butchers' Almshouses, Walham-green, for the Butchers' Charitable Institution. Mr. W. E. Stoner, surveyor:—

Lidstone	£222 0 0
Simpson	211 12 0
Stoner	207 17 0
Wilson & Exton	205 0 0

For the erection of shops at Albion-terrace, Kilburn Rise. Mr. Edward Monson, jun., architect:—

Beach (accepted)	£4,400 0 0

For pulling down and rebuilding the Bald-Faced Stag public-house, East End, Finchley. Revised estimate. Mr. H. R. Cotton, architect. Quantities by Mr. A. J. Gate:—

Toms (accepted)	£3,100 0 0

For rebuilding No. 1, Church-street, Stoke Newington Mr. H. R. Cotton, architect:—

Andrews	£1,270 0 0
Toms (accepted)	1,200 0 0

For alterations in converting a house into a shop, High Barnet, for Mrs. Gibson. Mr. E. Egan, architect:—

Butler	£338 0 0
Miller (accepted)	310 0 0

For the erection of carcasses, and partial completion of three shops on the site of the Manor Offices, Hackney, for Messrs. Webb & Dashwood. Messrs. Waymouth & Son, architects:—

Sawyer	£3,760 0 0
Harper	3,680 0 0
Smith & Son	2,989 0 0
Sheffield & Prebble	2,967 0 0
Shurmur	2,839 0 0

For alterations and additions to the St. James's School Clapton. Messrs. C. & W. Humphreys, architects:—

Shurmur (accepted)	£488 0 0

For alterations to 184, High-street, Stoke Newington. Mr. John Groom, architect:—

Shurmur	£144 0 0
Lamble	139 0 0
Stapleton	135 10 0

For the erection of Primitive Methodist chapel and school, Cross Keys, Newport, Monmouthshire. Mr. J. Wills, architect:—

Prosser	£1,950 0 0
Thomas	1,800 0 0
Limbrick	1,598 0 0
Lewis	1,565 0 0
Parfitt (accepted)	1,515 0 0
Jones	1,496 0 0

For house at Newham-in-Cleveland, for Mr. John Mills. Messrs. Alexander & Henman, architects. Quantities by Mr. Charles Henman. (First Contract):—

Perks Brothers	£7,424 0 0
Craggs & Benson	6,487 0 0
Barry	6,305 3 0
Inglis	6,155 0 0
Hammond & Chandler	6,146 9 1
Davidson	5,946 6 9
Heckle	5,828 0 0
Johnson	5,820 0 0

For Church of St. John, Stillington, Stockton-on-Tees. Messrs. Alexander & Henman, architects. Quantities by Mr. Charles Henman:—

Lazenby	£3,196 5 0
Inglis & Peak	3,100 0 0
Agar	3,009 0 0
Dickinson	3,054 0 0
Wilkinson	3,030 0 0
Foster	2,761 0 0
Craggs & Benson	2,700 0 0
Davison	2,655 0 0
Smirk	2,550 0 0
Caldcleugh	2,504 0 0
Grant	2,475 0 0
Yeo	2,350 0 0
Perks Brothers	2,267 6 0
Boyd & Harwood	2,246 0 0

For first portion of new workshops, Eagle Works, Tooley-street. Mr. Horace T. Bonner, architect:—

Jerrard	£339 0 0
Bird	335 0 0
Potten	244 0 0
Higgs (accepted)	239 9 0

For outside painting and repairs at Lewisham Workhouse. Mr. Horace T. Bonner, architect:—

Taylor & Son (accepted)	£157 0 0
For new water service:—	
Taylor & Son (accepted)	39 10 0

For the erection of music-hall, Greenwich (exclusive of decoration) called the Red Lion, for Mr. B. Phillips. Messrs. Stewart Bros., architects. Quantities prepared by Mr. R. Peters:—

Thompson	£1,057 0 0
Watson & Dennett	1,019 0 0
Went & Perkins	955 0 0
Higgs (accepted)	935 0 0

For repairs and decorations to St. George's Church, Hanover-square. Mr. A. J. Bolton, architect:—Homann & Sons, accepted.

For re-erection of a portion of warehouse premises, 104, 106, and 108, Curtain-road, Shoreditch, for Messrs. Parker Bros. Mr. J. Hamilton, architect:—

Hayworth	£2,175 0 0
Harper	2,125 0 0
Shurmur	2,043 0 0
Little	1,829 0 0
Boyce	1,789 0 0
Wood	1,781 0 0
Crabb	1,700 0 0

For rebuilding of No. 25, Upper-street, Islington, for Mr. Morris. Mr. W. J. Worthington, architect:—

Jones	£1,560 0 0
Banford	1 450 0 0
Pocock	1,444 0 0
Taylor	1,319 0 0
Sharman	1,300 0 0
Lamble (accepted)	1,265 0 0

For new premises, Bethnal-green-road, for Mr. Whitmore. Mr. F. Holsworth, architect:—

Hammond	£3,920 0 0
Williams & Sons	3,560 0 0
Forrest	3,547 0 0
Drew	3,505 0 0
Marr	3,491 0 0
F. & F. J. Wood	3,440 0 0
Mark	3,433 0 0
Conder	3,295 0 0

For the erection of new schools at Amberley-road, Marylebone Division, for the School Board for London. Mr. E. R. Robson, architect. Quantities by Mr. T. Thornton Green:—

Boyce	£5,883 0 0
Higgs & Hill	5,765 0 0
Kirk & Randall	5,434 0 0
Wall, Brothers	5,373 0 0
Tongue	5,257 0 0
Scrivener & Co.	5,206 0 0
Hook & Oldrey	5,118 0 0

For vicarage-house, at Kenn, Somerset. Mr. J. H. Spencer, architect. Quantities supplied by Mr. W. L. Bernard:—

Trevena	£2,156	0	0
Wescombe	2,099	0	0
Fox	1,889	0	0
Perry & Harvey	1,696	0	0
Hawkins	1,715	0	0
Drake	1,677	11	1
Hill & Summerhayes	1,668	7	6
Rendell & Sons	1,650	0	0
Wilcox	1,589	0	0
Green	1,455	10	0

For new wing and stables, and general decoration, at 40, Stockwell-road, for Mr. H. Croskie:—

W. Mitchell & Co. (accepted)	£394	0	0

For works of sewerage and water supply for Trefriw, Penmachno, and Dolwyddelen, for the Llanrwst Sanitary Authority. Mr. T. Roberts, engineer:—

	Penmachno.	Dolwyddelen.	Trefriw.
J. B. Jones	£1,507	£1,820	£1,840
Jeffreys	1,868	1,900	1,990
E. & R. Jones*	1,561	1,594	1,694
Bagbird	1,423	1,694	1,720
R. Jones	—	1,650	—
Mackintosh	1,908	2,450	2,683
Conway	2,619	3,938	3,917
Beasley	—	—	2,835
Hughes	1,592	1,897	1,955
Pitt	—	—	6,148
Morton	—	1,855	—
Beardsell & Co.	1,544	1,921	2,008
W. Jones	—	1,893	—
Pritchard	—	2,600	—
For water supply only:—			
Pontifex & Wood	483	772	615

* Accepted.

P.S. The contractor whose tender was accepted about two months ago failed before the contract was signed, and the Sanitary Authority had to invite fresh tenders.

For new factory, Newington-causeway, for Messrs. Crescens, Robinson, & Co. Mr. F. Chambers, architect. Quantities by Mr. S. P. Raggett:—

Browne & Robinson	£23,240	0	0
Ashby & Horner	23,330	0	0
Downs & Co.	22,700	0	0
Conder	23,496	0	0
Colls & Son	23,397	0	0
Brass	21,747	0	0
Holland & Hannen	21,265	0	0
Rider	21,180	0	0
Macey & Son	21,039	0	0
Greenwood	20,700	0	0
Scrivener & Co.	20,495	0	0

For rebuilding No. 95, New Bond-street, for Mr. Wertheimer. Mr. A. M. Ridge, architect. Quantities by Hovenden, Heath, & Berridge:—

Hoaking	£7,838	0	0
Nightingale	6,695	0	0
Brass	6,308	0	0
Kirk	6,301	0	0
Robinson	6,274	0	0
Browne & Robinson	6,222	0	0
Morter	5,918	0	0
Scrivener & Co.	5,826	0	0

For new Catholic schools at Leamington. Mr. J. H. Donnelly, architect. Quantities by Mr. J. Mansell:—

Parnell	£1,454	0	0
Smith	1,400	0	0
Loughten	1,350	0	0
Mills	1,285	14	0
Fell	1,275	0	0
Gascoyne (accepted)	1,240	0	0

For mission chapel and school-room, Cirencester-street, Paddington, for the Rev. R. T. West. Messrs. R. H. Carpenter & B. Ingelow, architects. Quantities by Mr. W. Smith:—

		Allowance for old materials.
Cox	£4,633	£10
Guy	3,995	25
Hobson	3,646	20
Patman & Fotheringham	3,644	10
Manley	3,007	30
Staines & Son	3,590	16
Scott	3,455	35

For painting, repairs, &c., to Brandon House, Streatham Hill, for Mr. C. Greenhill. Mr. E. Louchars, architect. Quantities not supplied:—

Brewer	£376	0	0
Franks	333	0	0
Trenaman	304	0	0
M'Lachlan & Sons	296	0	0

For municipal buildings, Hastings. Mr. W. Andrews, architect. Quantities by Strudwick & Mennie:—

Martin	£14,687	0	0
Hermes	14,395	0	0
Jenkins	14,000	0	0
Woodall	13,910	0	0
Womersley	13,750	0	0
Reeve	13,700	0	0
Loneley	13,660	0	0
Vidler	13,510	0	0
Rodda	13,487	0	0
Nightingale	13,181	0	0
Dartnall	13,175	0	0
Bradd & Co.	13,110	0	0
Cruttenden	12,995	0	0
C. & E. Hannan	12,670	0	0
Jones (accepted)	12,180	0	0

For new stables, at the Royal Standard, Victoria-street, Pimlico, for Mr. Wake. Mr. H. I. Newton, architect:—

Hatchman	£474	0	0
Beales	438	0	0
Godden	405	0	0
Anley	394	0	0
Taylor	376	0	0
Lamble (accepted)	339	0	0

For alterations to house, High-street, High Barnet, for Mrs. Gibson:—

Butler	£338	0	0
Mellor (accepted)	330	0	0

For house, in Victoria-road, New Barnet, for Mr. E. Dickinson:—

Butler (accepted)	£515	0	0

For alterations and additions to farm buildings, at Beckjay, for Mr. John Rouke. Mr. T. Evans, architect:—

Grosvenor	£1,580	13	0
Williams (accepted)	1,000	0	0
Price & Deakin	983	0	0

For sundry works, at Coppins, Iver, Bucks, for Mr. J. E. Taylor. Messrs. Tarring & Wilkinson, architects:—

For erecting porch and bay-windows to dining-room and staircase:—			
Fassnidge & Son	£465	0	0
For staircase and hall panellings, &c.:—			
Perry & Co.	£611	0	0

For 2,650 ft. of 4-ft. by 2-ft. 9-in. brick sewer, in Scrubs-lane, Hammersmith, for the Fulham District Board of Works. Mr. Alfred C. Bean, engineer:—

	Stock bricks.	Gault bricks.
Mears	£8,600	£8,975
Nowell & Robson	8,475	8,800
Keeble	8,150	8,500
Willams, Son, & Wallington	7,380	7,780
Hatton & Co.	4,650	—

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Barnstaple.—For "Walden Viaduct" (p. 1067, *ante*), read *Meldon Viaduct.*

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M. STODART & CO.
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